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All communications should
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- EDWARD A. SIMMONS, *President*
- LUCIUS B. SHERMAN, *Vice-Pres.*
- HENRY LEE, *Vice-Pres.*
- SAMUEL O. DUNN, *Vice-Pres.*
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CHICAGO:
105 West Adams St.

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17th and H Streets, N. W.

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Terminal Tower

SAN FRANCISCO:
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Railway Age

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June 22, 1929

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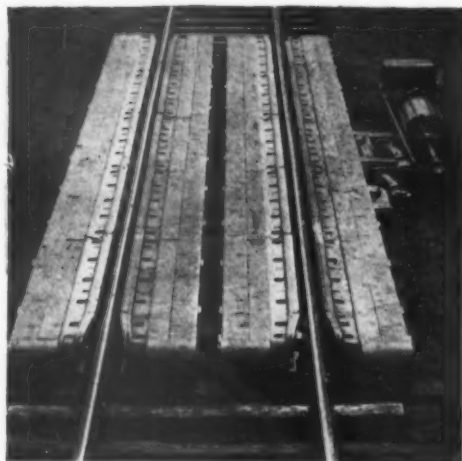
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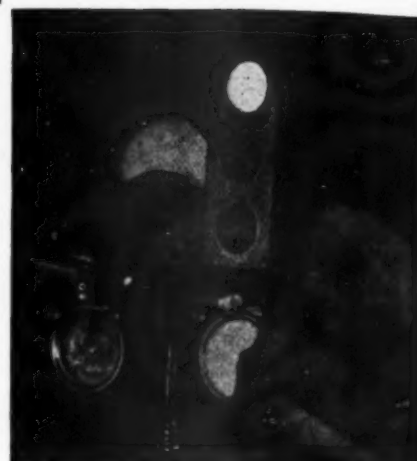
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Engineering Index Service

"Union" Electro- Pneumatic Car Retarder



"Union" Continuous Cab Signals



"Union" Dispatcher Controlled Signaling System

"UNION"

UNION Electro-pneumatic Car Retarders minimize terminal delays through rapid car classification.

IN TWO "Union" equipped yards on one railroad, car retarders have contributed largely to improvements making possible estimated annual operating savings of \$800,000.

ANOTHER railroad shows operating savings in one "Union" equipped yard of approximately \$200,000 a year. . . .

TRAIN operation by signal indication under centralized control by the "Union" Dispatcher Controlled Signaling System simplifies train movements with safety and savings. Train orders are superseded by the indication of the fixed signal.

ON ONE recent installation double tracking was indefinitely postponed at a saving in first cost of \$590,000. Other savings are immediately apparent.

CONTINUOUS Cab Signals provide indications irrespective of the weather conditions or physical obstructions. These indications are displayed instantly in the cab for any changed condition on the track ahead.

"UNION" Cab Signals prevent the misreading of wayside indications, expedite traffic and increase safety because the engineman is always advised on what to expect. . . .

1881  **Union Switch & Signal Co.**  1929
SWISSVALE, PA.

Railway Age

Vol. 86, No. 25

June 22, 1929

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Page 5 of Advertising Section

Railroads and Advertising

IN a recent address L. A. Downs, president of the Illinois Central, paid tribute to advertising as a force in modern life. "No man can successfully engage in any kind of business today," said Mr. Downs, "without a realization—indeed, a real appreciation—of the tremendous power of advertising. I am frank to say that I consider it the greatest force in business life."

Railroads and advertising, as Mr. Downs pointed out, have grown up together. Railroad transportation has made possible the rapid and widespread distribution of goods without which effective advertising on the present extensive scale would have been impossible. Likewise, railroad transportation has made possible the rapid and widespread distribution of the publications in which most advertising appears. The government is sometimes praised for the efficiency of the postal service, by which most publications are distributed, but the post-office department was entirely dependent upon the railways for fast and regular transportation until the air mail was established, and is still principally dependent upon them for the needed kind and amount of transportation.

It would be difficult to exaggerate the influence that advertising has exerted in making business and living conditions in the United States what they now are. The production and consumption of goods are interdependent. While production supplies goods, consumption creates the effective demand for them, and production cannot long exceed this effective demand. The productive capacity of industry in the United States long since was sufficiently developed to enable it to supply enough necessities for all the people. Advertising is and for years has been the most potent force for stimulating the demand from all classes of the people for comforts and luxuries. This increasing demand for comforts and luxuries has constantly reacted upon and stimulated production. The increased demand for larger amounts of things formerly produced only for a few has made it possible to reduce unit costs of production, which has brought a constantly increasing number of things within the purchasing power of a constantly increasing number of persons. Salesmanship, and especially advertising as the most important part of it, has increased the demand for the things produced at the lower costs, and thus production and consumption have been augmented and the standards of living of all classes of the people have been raised to an extent not dreamed of by past generations.

This increase in production and consumption has been largely responsible for the huge increases in railway freight business that have occurred over periods of years, and thus advertising has been an important factor in increasing freight traffic, although the rail-

ways have seldom advertised their freight service. The railways have spent large amounts in advertising their through passenger service, especially that of a more luxurious character, and through passenger business has been to a great extent built up by advertising. Within recent years the railways, sometimes collectively but usually individually, have published advertising to present the facts about their business to the public and to prevent or correct misunderstandings regarding it. Mr. Downs in his address gave some interesting information about the prolonged and extensive public relations advertising of the Illinois Central.

The railways probably would profit by more advertising carried on by them individually or collectively to improve public sentiment and help them meet the competition of other means of transportation. Why have they not used more advertising to point out the superiority in point of safety, speed, comfort and dependability of railway transportation as compared with highway transportation for any but short trips? Perhaps they have thought this kind of advertising might have some effect upon the traffic received by them from automobile companies. Might they not collectively, in smaller or larger groups, do advertising that would help to influence more people to travel and ship by rail rather than by other means?

One interesting feature of the relations between the railroads and advertising which Mr. Downs did not touch upon is the effect that advertising has produced upon the physical development, maintenance and operation of the railroads. Year after year the tracks, signaling, stations and equipment of the railways have been revolutionized until at present they are widely different from what they were in the past. Some of the improvements in devices and equipment have been originated by officers of individual lines and some by manufacturers; but by whomever they have been originated they have had to be sold to the railways through their executive, technical and purchasing officers. How has it come about that within recent years the steam locomotive has been revolutionized by changes in its design, and especially by being equipped with numerous new fuel-saving and power-increasing devices? How have the railways been influenced to buy so much new and improved machinery for saving labor in shops and on the tracks? Why have they installed so many more miles of automatic block signaling than ever before? Of all the forces that have operated to cause the railways to adopt improvements in their plants to save labor, fuel and materials, and to better service, none has been more important than the advertising that has been done by manufacturers especially to reach, inform and influence railway officers.

There are those who say that a large part of the expenditure made by modern industry and commerce for advertising involves economic waste. Whether advertising causes economic waste depends upon what is advertised and how it is advertised. Advertising is done to create a demand for things. If they are things that nobody should want the advertising causes waste. If the advertising is not so done as to create or increase demands, it results in waste. If, on the other hand, the thing advertised is something the people should want as a means of increasing the comfort and pleasure of living, or something railroads or other industries should want to enable them to reduce their costs or improve their products or service, advertising of it does not cause waste, if it has the desired effect of creating or increasing demand, but has valuable social or economic effects.

Like anything else, advertising may be poor or good. If a concern has a good thing to sell, and advertising does not help to sell it, there is something the matter with the advertising. The effectiveness and value of advertising as a sales force has been amply demonstrated by modern experience. Said Mr. Downs in the address referred to: "Advertising is the motive power which pulls the gigantic train of modern business." It can be poorly or well used; but under modern conditions a railroad or any other concern that does not use it constantly will either have to use more expensive means of getting business, or see its business taken from it by competitors that understand better how to create and increase the demand for their products or service.

What Next?

A FEW days ago a supervisory maintenance officer was discussing with one of his track foremen the changes in the character of the labor employed in track work, and particularly in the floating gangs, that have taken place within their time. They reviewed the transition from the native born residents of the communities along their lines to the Irish and Scandinavian immigrants of 40 years ago, their replacement early in the present century by new arrivals from Southern Europe, particularly Italy and Greece, and, since the war, the replacement of these men in turn by the Mexican. At the conclusion of this discussion the officer asked the foreman what would be next, and his reply was, "Machinery, I guess."

In this simple answer there was reflected an understanding of a development in maintenance of way practices that is in its infancy today, and yet that is progressing with such rapidity that few railway officers are fully aware of its ramifications. When one considers that a single road has purchased more than \$1,500,000 worth of mechanical equipment for maintenance operations this year, and that many other roads are buying in corresponding volume, he begins to gain an appreciation of the rapidity with which the transition is being made from "Mexican to machinery." These purchases include many units of equipment that were unthought of five years ago, while others are appearing almost daily. This development holds much of promise to railways, and it is to their interest to encourage it.

The trend is not, however, without its problems for the railways, many of which are managerial. It is not enough to purchase equipment and turn it over to the maintenance of way department. It must be so used and its use so supervised, and it must be so maintained as to enable the best results to be secured from it. Are

the forces so organized as to use this equipment most effectively? Is the supervision such as to insure that each unit of equipment is employed the maximum percentage of time? Is the work of various sections, subdivisions and divisions so programmed and correlated that the equipment can be transferred from one territory to another without delay? Are provisions made for the maintenance of the equipment most efficiently, or is it parcelled out to existing shops that are organized and trained for the repair of very different kinds of equipment? These are a few of the questions that must be considered and answered properly before a road can be sure that the equipment which it is now buying will yield the maximum results.

The purchase of work equipment for maintenance forces marks the beginning of a new day in maintenance of way operations which requires modifications of methods in many respects. It is a function of management to insure that the methods in vogue on the railways are adapted to the new equipment.

Reducing Railway Inventories

THE railways have enjoyed a larger measure of prosperity thus far in 1929 than in any year since the war principally because of the great economies in operation that they have effected, and these economies are so large in the aggregate because they have been made in the conduct of almost every branch of the business. They have made a contribution of incalculable importance to the prosperity of the nation by completely eliminating car shortages, speeding up their freight service, and making it almost completely dependable, with the result of enabling industrial and commercial concerns of all kinds to effect huge savings in their costs through reductions in the inventories carried by them. The railways have not lagged behind other concerns in taking advantage of the opportunity afforded by the improvement in their service to reduce their own inventories.

The value of stocks of goods carried depends, of course, upon the prices paid for them, as well as upon the quantities carried. Statistics which have just been compiled by the *Railway Age*, and which are published elsewhere in this issue, show that at the end of 1928 the stocks the railways had in their storehouses were less than in 1917, or any subsequent year. The stocks carried by the Class I railroads at the end of 1917 represented an investment of about \$530,000,000. Owing to rising prices, and perhaps to other causes this increased in 1918 to \$630,000,000, and in 1920 reached the record figure of \$755,600,000. The annual cost of carrying inventories includes interest, depreciation, obsolescence, cost of rehandling and other factors, and depends to a considerable extent upon the kind of goods carried. The most satisfactory study of the matter that has been made on behalf of the Purchases and Stores division of the American Railway Association indicated that the annual cost of carrying such supplies as the railways carry averages 18½ per cent of the investment.

On this basis it cost about \$140,000,000 to carry the supplies on hand in 1920. The value of the supplies carried had been reduced at the end of 1923 to \$683,000,000, on which the annual carrying charge was about \$126,400,000. The reduction between 1920 and 1923 was, no doubt, due to declines in prices, as well as to reductions in quantities. Prices have been unusually stable during the last five years, however; and yet at the end of 1928 the investment in the supplies on

hand had been reduced to about \$472,000,000, on which the annual carrying charges were about \$87,300,000. The saving effected in the cost of carrying inventories as compared with 1920 was about \$53,000,000, and as compared with 1923 about \$39,000,000. The reduction in inventories last year as compared with 1927 was \$53,300,000, and caused a reduction in the annual carrying charges of almost \$10,000,000.

The reduction that has been made by the railways in their inventories and in the annual cost of carrying them, affords but one illustration, although an important one, of many that can be cited to show how, in spite of increases in their freight business and in the average wages paid by them, they have made large reductions in their operating expenses within recent years.

Increasing the Capacity of Bottle-Neck Tracks

ONE of the most serious problems encountered in reducing the running time on certain divisions of many railroads is to eliminate excessive delays and congestion in moving trains through short sections where the track capacity is limited. Typical examples of this condition are found on tracks through tunnels, over long trestles or bridges, up long heavy grades and over sections of single track between the ends of double track. In many cases operation is further complicated where trains of two or more divisions or roads use such section of track jointly.

The use of train orders to direct train movements through these bottle-necks imposes delays at points where trains should be kept moving to prevent congestion. Errors in issuing train orders, or failure to obey them, have resulted in disastrous accidents on such sections of track. The electric train staff system was developed to protect train movements under such circumstances, but because of certain limitations and the divided responsibility involved, such equipment is rapidly passing into the discard.

In the place of train orders, staff systems and other special arrangements for directing train movements, modern signal and interlocking equipment is being installed to direct train movements by signal indication. Traffic locking circuits have been improved to eliminate any chances for false operation. The Chesapeake & Ohio, for example, developed a high frequency check locking system for directing train movement through tunnels by signal indication. The Lehigh Valley has recently installed an extensive interlocking to handle the switches and signals at both ends of its new tunnel in New Jersey, train movements being directed by signal indication in either direction on each of three tracks, all under the control of one man. A similar arrangement is being provided for operation through the Hoosac tunnel on the Boston & Maine.

Likewise, the Denver & Rio Grande Western has installed the centralized control system to operate the switches and to control the signals to direct trains through the Tennessee Pass tunnel in Colorado. The Louisville & Nashville installed an automatic signal interlocker to direct trains over a gauntlet nearly a mile long at Nashville, Tenn.

These installations show how modern signaling equipment can be used to reduce train delays, increase safety, and reduce the cost of operation on sections of track known as bottle-necks.

"The Feed Box"

THE Gulf, Mobile & Northern believes in keeping its employees acquainted with its problems. The progress of its plan of employee relationship has been outlined from time to time in previous issues of the *Railway Age*. One of the most successful methods of enlisting employee support has been the issuance of three or four-page mimeographed pamphlets, in colors, to all employees interested. "The Hot Box," for example, is devoted to car movement, and "The Fire Box," to fuel economy. The latest addition to this series of pamphlet periodicals is "The Feed Box," which concerns itself with livestock claims. The subject is treated in an interesting and unusual manner. It is pointed out that 5,731 head of stock has been struck in the past nine years, and, if this stock had been hauled over the line as revenue freight, it would have resulted in 119 carloads.

Instead of securing the freight revenue, nearly \$200,000 was paid in damage claims. A specific case is given, showing that a certain passenger train had to make four trips in order to earn in gross revenue, the value of one mule killed on the right-of-way. It is pointed out further that the sum paid for damage to live stock would have purchased nearly 100 new stock cars, 20 miles of heavy rails or four or five locomotives. The pamphlets are well illustrated to add to the interest. One illustration is particularly striking. It shows two turkey buzzards in conversation, one saying to the other: "Brother, this is going to be a lean year for us on the G. M. & N. Let's leave." The latest division to the series of pamphlets bids fair to take its place with the others in securing results.

Study Sheds Light on Grade Crossing Problem

INSPIRED by the belief that the first step toward a solution of the grade crossing problem is an analysis of all relevant factors, the California Railroad Commission made a statistical survey of all the accidents at grade crossings within the state during the three years 1926 to 1928. Such an effort is highly commendable, for it is in accord with the basic principles formulated by the National Safety Council. Thoroughness has surely been attained in the commission's study, for almost every conceivable classification of accidents has been made, as the reader will note from an examination of the article in this issue relating to the California investigation. The state noted for the intensity of its "sunshine" has increased the illumination of a problem that needs the attention of the best minds in the fields of railway and highway transportation.

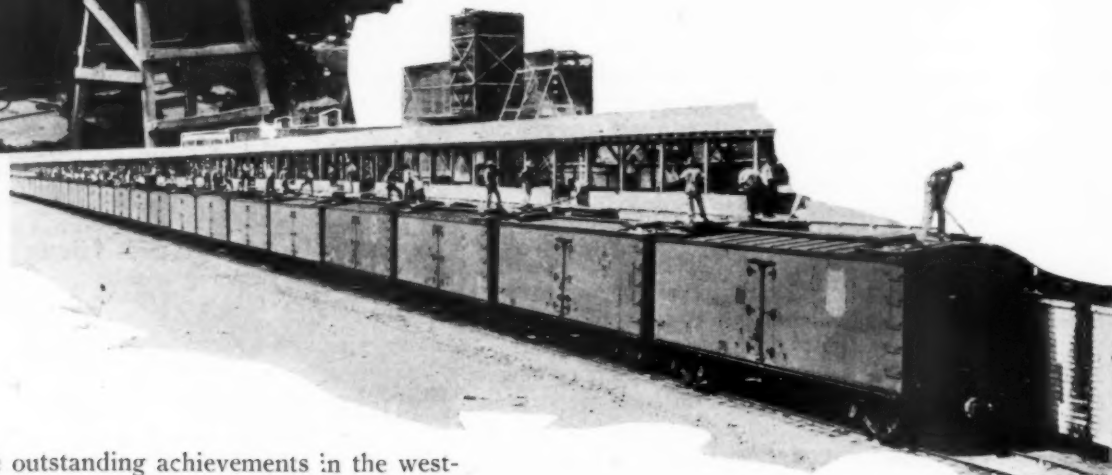
One fact stands out clearly, and that is, that the urban crossings present a far more hazardous situation than do the crossings of the state highway system outside of the corporate limits of municipalities. This, in turn, emphasizes the importance of eliminating obstructions to the view of a driver approaching a grade crossing in a city or town. It is also interesting that over 70 per cent of the accidents occurred during daylight hours. These facts as well as numerous others brought out in the report should be of benefit to the railroads in increasing the effectiveness of highway crossing protection.

Car Conditioning



Vital Factor in Melon

*The Southern Pacific organizes
ment—Pacific Fruit Express
also ic*



IN one of the outstanding achievements in the western transportation field, the Southern Pacific annually handles over 18,000 carloads of melons, augmented by heavy shipments of lettuce and other agricultural products, in a period of 10 weeks, out of the Imperial Valley, Southern California. The keynote of the successful movement of these highly perishable commodities in such a short period of time is the careful advance preparation and organization on the part of the railroad, supplemented by the effective efforts of the Pacific Fruit Express Company in providing sufficient refrigerator cars, thoroughly inspected, repaired and conditioned in advance, and in maintaining efficient organizations and adequate icing facilities.

Melons Fourth Largest California Crop

California, the richest agricultural state in the Union, produced in 1928, according to figures furnished by the United States Department of Agriculture, over 71,000 carloads of grapes, 45,000 carloads of oranges, 33,000 carloads of lettuce and 25,000 carloads of mixed melons, including cantaloupes, casabas, honey-dews, etc. Of these melons, 18,950 carloads (48 per cent of the total production in the United States), came from a little strip of land 45 miles long by 35 miles wide, located in the Imperial Valley.

This land, formerly a desert waste, is 50 ft. below sea level and subject to summer temperatures up to 120 deg. F. It is irrigated with water from the Colorado

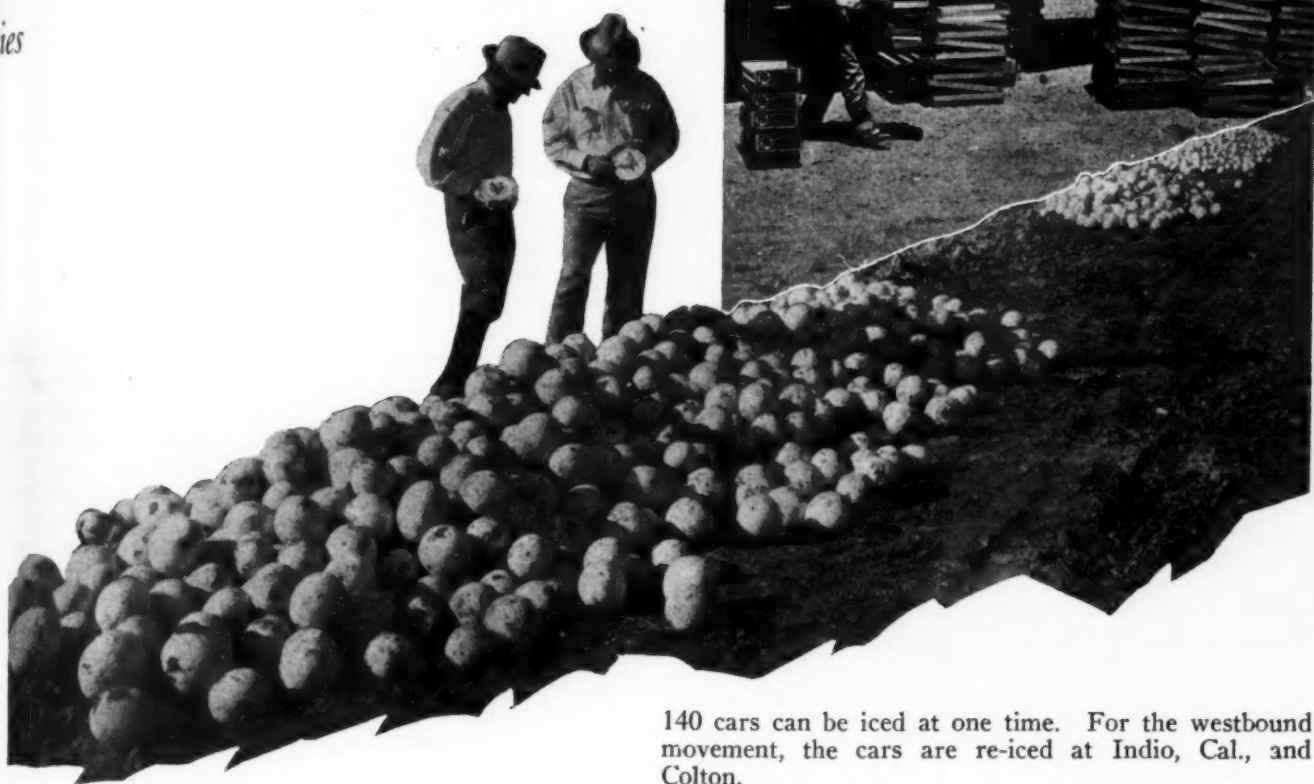
river, and possesses the soil and climatic conditions most favorable to the raising of cantaloupes. Its railroad facilities include a 33-mile branch line of the Southern Pacific from Calipatria to Calexico, with a 22-mile branch east and south to Sandia and a 14-mile branch west and south to Westmoreland. Suitable storage tracks, spur tracks and loading platforms are provided at 25 cities and towns in the territory.

The Pacific Fruit Express Company maintains, during the busy season, offices and clerical forces at Calexico, El Centro and Brawley, the latter point being the central office. To man these offices requires the employment of about 35 men. The offices are established to assure satisfactory distribution of cars, furnishing of service and the proper compiling of necessary records, also to furnish service to shippers and receivers alike in connection with passing advice in the handling of diversions on all perishable freight. This service is effectively provided through agencies established at strategic points from the Pacific to the Atlantic seaboard, and is equal to that furnished by any transportation agency in the country.

For most expeditious handling of the crop, the Valley is divided roughly into three districts, Brawley serving as concentrating point for the northern district, El Centro for the central and Calexico for the southern. The icing, distribution and loading of cars are all

Watermelon Handling

izes five Imperial Valley move-
Express and furnishes cars,
Also ices



directed from these points. The switching of cars to loading stations and sheds in each district is performed from the central point, cars being picked up and returned for re-icing before consolidation into trains for movement eastward, or westbound to the Coast markets. Owing to the delicate and highly perishable nature of the crop, both pre-icing and final icing of the cars after loading are necessary.

Over 140,000 Tons of Ice Required Annually

Ice required in the Valley is purchased from the Imperial Ice & Development Company and handled by Pacific Fruit Express forces over owned platforms situated at Brawley, El Centro and Calexico. The total ice consumption at these three points in 1928 amounted to 142,881 tons. The icing docks at the three points mentioned will accommodate a total of 145 cars at one time. Subsequent re-icing of eastbound movements on the Southern Pacific lines takes place at Yuma, Tucson and El Paso, the Pacific Fruit Express Company maintaining icing platforms at each point where a total of

140 cars can be iced at one time. For the westbound movement, the cars are re-iced at Indio, Cal., and Colton.

The refrigerator cars are bunkered with ice, moved from the storage house by suitable mechanical conveyors to a platform extending over the cars, and then broken into small pieces and tamped down in the ice tanks. Approximately $2\frac{1}{2}$ min. per car are required for supplying 5.3 tons of ice, the average bunker capacity, two men working simultaneously at the bunker in each end of the car. The icing gang usually works on 6 to 8 cars at one time. From 500 to 600 ice men are required at the three stations in the Valley during the height of the season.

The cantaloupe movement begins about the middle of May, reaches a peak of approximately 500 cars a day by the middle of June and is practically over by the first of August. Satisfactory handling of this intensive movement requires the co-operation of shippers and clock-like precision in railroad and car line operations. To bring this about, pre-harvest meetings are held yearly, attended by shippers and transportation men from all branches of the service when the different phases of the situation are discussed and careful plans laid for handling of the crop.

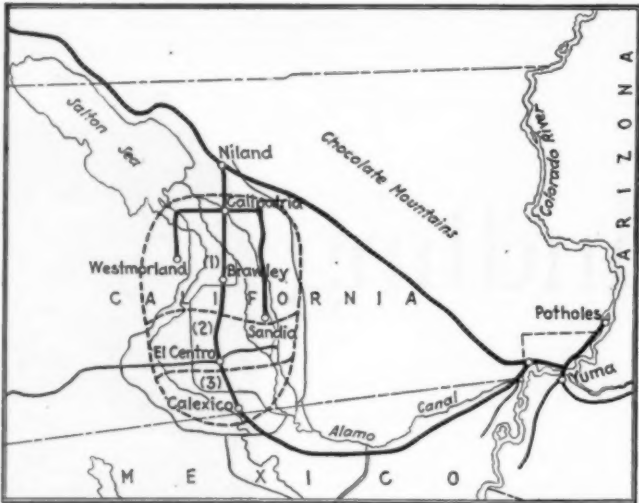
For weeks prior to commencement of the shipping season, Pacific Fruit Express Company cars are rounded up in the East and directed through southern gateways for movement to the Imperial Valley. Those received through El Paso, Tex., are moved to and through the Pacific Fruit Express Company's light repair shops at Tucson, Ariz. Here, during the peak season, about 145 men are engaged in cleaning, painting and repairing cars that they may be placed in the best of condition before being sent out for loadings. Cars requiring more extensive repairs pass on to the Pacific Fruit Express Company heavy repair shops at Colton, Cal., or Los Angeles. Cars coming from the North also are thoroughly overhauled either at Los Angeles or Colton shops, both of which are equipped to rebuild cars in their entirety. Before the rebuilt or repaired cars leave the shops, their doors are sealed to assure the cars remaining clean until arrival at their destination. Exception to this rule is made in the case of cars which cross the Mexican border shortly before reaching the Imperial Valley and consequently must be open for customs inspection.

Cars Stored—Power Conditioned

On arrival at the Imperial Valley and nearby points, the cars are stored in anticipation of the heavy movement to follow and to provide a reserve supply should any interruptions occur to prevent the normal flow of empties from the East. Approximately 2,000 cars are held in storage on tracks adjacent to the Imperial Valley, including the San Diego & Arizona and the Holton Interurban Railway. Between Yuma and Tucson, approximately 1,000 cars are held in storage and, between Tucson and El Paso, about 1,500 more, making a total of 4,500 cars available. At Colton and points west the storage capacity is adequate for approximately 1,500 cars.

In connection with this storage of cars, the Southern Pacific has one principal objective, namely, to place only a sufficient number of cars in reserve so that, with empties received daily from the East, all car requirements will be met, without having to draw on stored cars between Colton and Los Angeles, which would involve an eastward movement of empties. This objective was accomplished in 1928 in spite of an unusually heavy crop.

Ample motive power also is a prime requisite.



Map of Southern Pacific Lines in the Imperial Valley

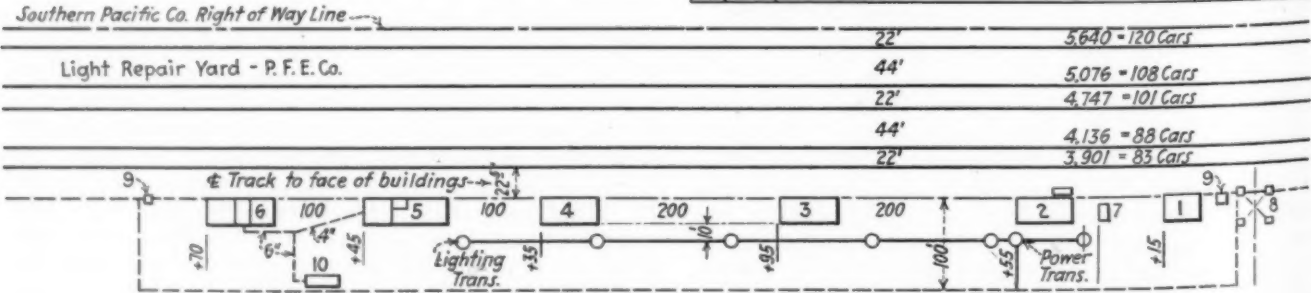
Switching power used in the Valley consists of 2-6-0 type locomotives weighing 126,000 lb. on the drivers. During normal operation, two of these switchers are located at Calexico, one at El Centro and one at Brawley. During the peak cantaloupe movement, this motive power is increased to five switchers at Calexico, six at El Centro and seven at Brawley. Running repairs and monthly washout and Federal inspections of these locomotives are made at the Calexico enginehouse. Three regular road locomotives, or haulers, of the

2-10-2 type, weighing 306,000 lb. on the drivers, tie up at Brawley and make road trips to Yuma, and return. At Yuma, each train is given a block number, thereafter being known by that number and hence traceable as a unit to destination. Two 2-10-2 class locomotives are also used to handle mixed perishable trains west, daily. These 2-10-2 locomotives work in and out of pools maintained at Los Angeles. All power is placed in good condition before the cantaloupe movement begins and practically no failures or delays are encountered.

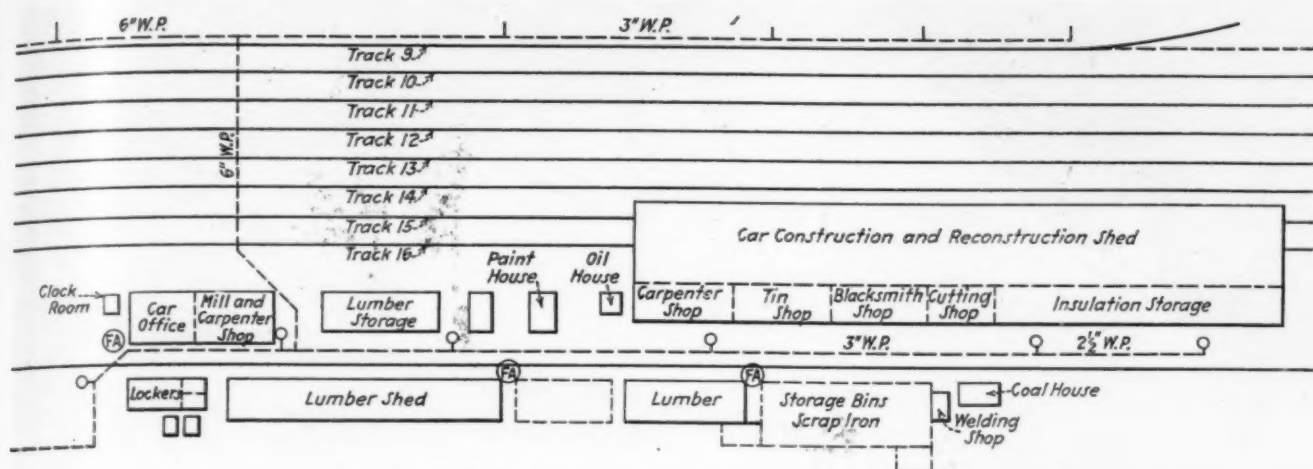
To assure freedom from delays as far as cars are concerned, three car inspectors are temporarily stationed at Brawley, two at El Centro and one at Calexico during the cantaloupe season to oil journal boxes, inspect air hose, make running repairs and test air brakes. The principal inspection of cars by railroad forces occurs at Yuma, however, and, from that point on, particularly close inspection and careful attention are given to assure the trains going through without delay. If, for any reason, a car must be set out, it is promptly repaired by railroad forces and usually returned to service in time for the following block.

At the commencement of the cantaloupe season, the Southern Pacific trainmaster assigned to the Indio-Yuma district makes his headquarters at Brawley, the

SCHEDULE OF BUILDINGS		
1	Paint Shop	30 x 40
2	Blacksmith and Machine Shop	30 x 60
3	Mill Building	30 x 60
4	Insulation and Lumber Storage	30 x 60
5	Office and Store	30 x 90
6	Toilet and Locker Room-Tool House - Brake Shop	30 x 75
7	Pump House and Well	14 x 14
8	Water Tower (Proposed Location)	
9	Hose Reel House	6 x 8
10	Septic Tank	7 x 17



Pacific Fruit Express Light Repair Yard and Shop Layout at Tucson, Ariz.



Layout of Pacific Fruit Express Car Repair Shops and Yard at Colton, Cal.

largest individual shipping point, and three assistant trainmasters are located, one at Brawley and two at El Centro. A general yard master and one assistant are also on the ground at Brawley and an additional yard master at Calexico. The trainmaster is looked at in approximately the same light as a general manager; that is to say, all officers who have to do with the movement of trains, furnishing of locomotives, equipment, ice and supplies of all natures, assist him in every way possible, practically the same as if he were a ranking officer of their division. It is only by this close co-operation that successful handling of the cantaloupes is assured.

As the volume of business increases, crews are established and additional switchers placed in service. These switchers serve the loading stations adjacent to the principal towns in the Valley. For example, at Brawley, two crews spot cars and pull away loads, two crews are assigned to each of the branches and one does tramp work.

Novel Control of Switchers

All locomotives in the Valley except the switchers are operated on train orders in the regular manner, but a novel method is used to control switcher movements. A double phone line is in use from Niland to Calexico and on both branches. Phones are established at Niland, Calipatria, Brawley, Imperial, El Centro, Heber and Calexico as well as at the end of both branches, Sandia and Westmoreland. As soon as the trainmasters are established, an order is issued by the train dispatcher requiring all, except first-class trains moving from Niland to Calexico or on either branch, to call the trainmaster at Brawley from Calipatria before departure from that point and obtain a permissive card. This card gives authority to move from Calipatria to Brawley or Sandia or Westmoreland. At Brawley they obtain cards to move to Imperial. At Imperial the conductor calls back to Brawley, releasing the block to the trainmaster at that point. He then calls El Centro and obtains permission from the trainmaster at

that point to move from Imperial to El Centro. At El Centro permission is given him to move to Heber, and at Heber he releases the block to the trainmaster at El Centro, obtaining permission from the yardmaster at Calexico to move from Heber to Calexico. The same restrictions are placed on westbound trains from Calexico. This enables the trainmaster or yardmaster to move the switchers to and from outside points without the necessity of obtaining orders, which is a vital need during this heavy movement.

The total number of cars of cantaloupe shipped from the Imperial Valley during the 1928 season amounted to 18,950 cars, of which 15,600 cars moved to points east of El Paso. Last season the fastest schedule provided running time from Brawley to Chicago of 142 hr. 30 min., and from Brawley to St. Louis, 127 hr., which afforded suitable connections for points east.

Light Repairs Handled at Tucson

Light repairs to empty westward-moving refrigerator cars are largely handled at the Pacific Fruit Express Company shops and yard, built in 1928 at Tucson, Ariz. The total repair-yard capacity provides for about 500 cars on five tracks. The buildings include a paint shop, 30 ft. by 40 ft.; blacksmith and machine shop, 30 ft. by 60 ft.; mill building, 30 ft. by 60 ft.; lumber storage, 30 ft. by 60 ft.; office and store, 30 ft. by 90 ft.; locker room, tool house and brake shop, 30 ft. by 75 ft.; and pump house, 14 ft. by 14 ft. Approximately 200 men are employed, all crafts being represented.

The repair men stationed at Tucson, as at other Pacific Fruit Express Company repair points, are trained in the proper handling of their work, with particular reference to initial inspection. Inspection of the cars is accomplished in accordance with the diagram, which is in general use at all Pacific Fruit Express Company shops. A total of five inspectors, one of whom is in reality a light-repair foreman, are assigned to the job. Inspector 1, the recorder, has a supply of

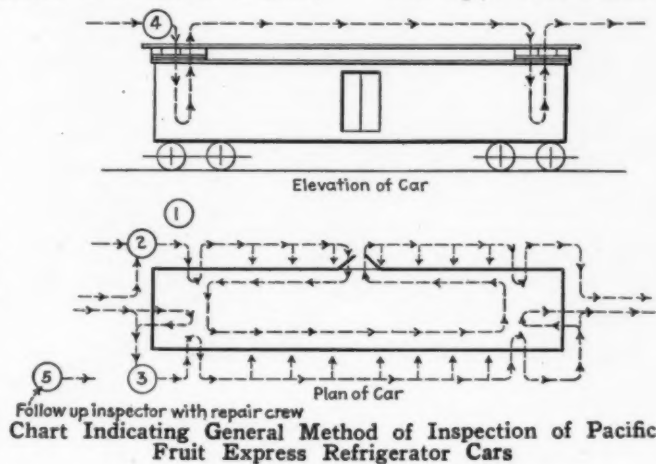
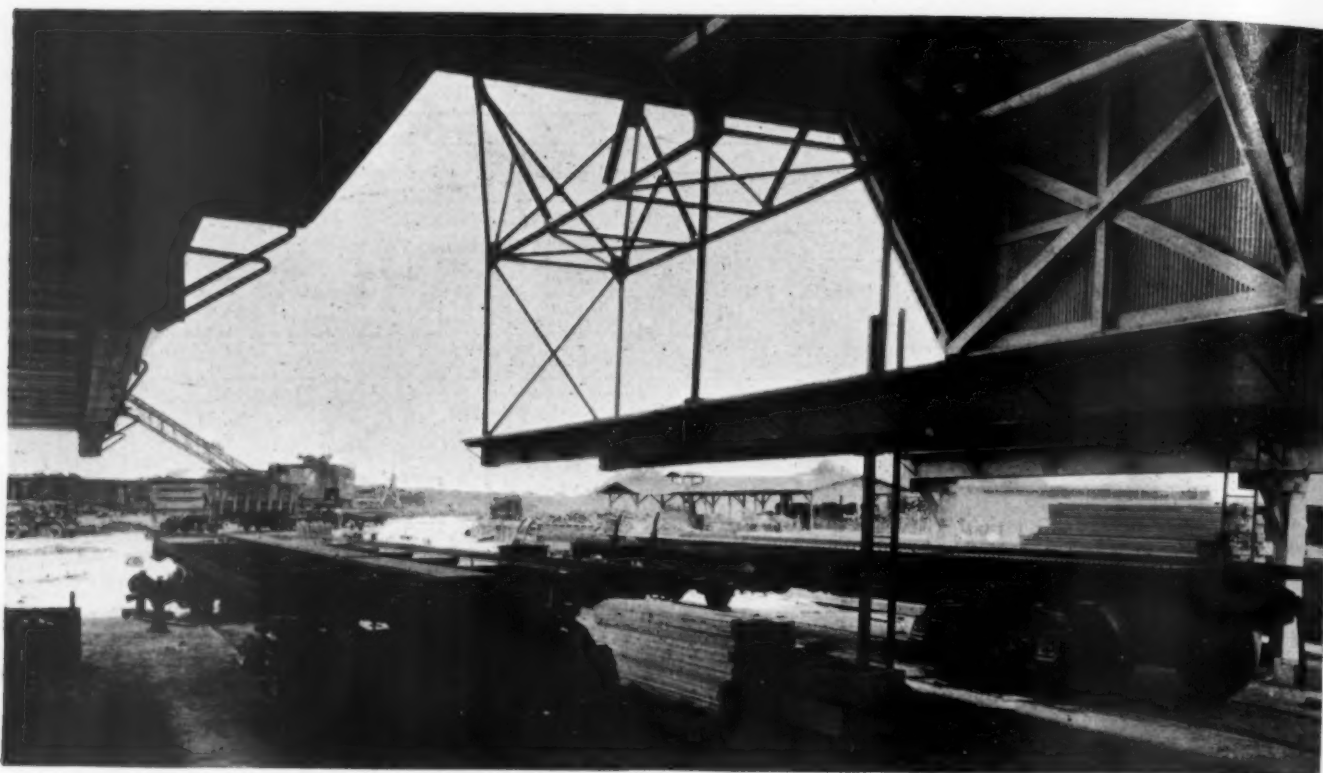


Chart Indicating General Method of Inspection of Pacific Fruit Express Refrigerator Cars



Initial Station for Rebuilding Cars at Los Angeles Shops—Permanent Scaffolds Supported from Roof Add Greatly to Neatness and Productive Capacity

Form 59, or door cards, and is capable of properly and legibly recording all defects found by inspectors. He also is equipped with chalk to mark any defects which he notes.

Inspector 2 inspects draft gears, trucks, underframes, sides and ends and the side doors, and also enters the body of the car and makes inspection of the interior, marking all defects plainly with chalk.

Inspector 3 is equipped with a coupler height gage and inspects all draft gears, gages couplers, inspects trucks, underframe, sides and ends of car on the opposite side from Inspectors 1 and 2, marking plainly with chalk all defects noted.

Inspector 4 is equipped with a short-handled broom and makes inspection of ice tanks, hatch covers, plugs and all roof fixtures, tests hand brakes and sweeps down the walls of the ice tanks and the tops of the ice grates, removing all rubbish and seeing that the ice grates are in the proper position, plainly marking with chalk all defects found.

Inspector 5, or the light-repair foreman, is stationed with repairmen and directs and advises with them, seeing that repairs are properly made and that materials are promptly delivered. He passes judgment on any work or defects found which have not been noted at the previous inspection. He makes a note on door cards of any

additional defects found, and, after repairs have been properly made, the doors and plugs tested and the car properly cleaned, he signs the door card in the space provided, indicating that such work has been performed and that the car is in first class condition for loading.

Inspectors 2, 3 and 4 call out defects found distinctly to the recorder in order that correct record can be made on the door card of their findings. The inspection of all cars is made in advance of the repairmen, the inspectors starting work about 30 minutes before the repairmen.

In case of wheel defects, the cars are switched to the wheel track after other work is completed, the actual changing of the wheels being handled in the Southern Pacific shops at Tucson. All changing of brasses, repacking of journals, etc., is handled by the Pacific Fruit Express Company forces.

An extensive program of painting is carried on at Tucson on account of the favorable climatic conditions. Both spray and brush painting, mostly the latter, are employed. The trucks and underframes in particular are economically painted with the spray gun.

Cars requiring heavy repairs are allowed to pass to Colton or Los Angeles shops which are better equipped to handle this work. The final inspection after repairs are made is carried on by a competent inspector who seals the cars, applies tags



Handling Material at the Los Angeles Shops

stating that the cars are clean and ready for service, and giving the name, station and date.

The Pacific Fruit Express refrigerator-car maintenance facilities at Los Angeles shops, much the same as those at Colton, include a general repair shop equipped for rebuilding and making all classes of repairs, except wheel repairs, which are handled by the Southern Pacific. The site of the Los Angeles shops comprises about 12 acres on which slightly over seven miles of repair tracks are laid, with

sufficient capacity to accommodate approximately 500 cars, 250 cars in the light repair yard and 250 cars in heavy repair yard.

Approximately 450 men are employed in the repair yard, various shops and stores. A shed 600 ft. long, containing three tracks and accommodating 36 cars, is used for building and rebuilding car bodies.

Five tracks, assigned to light repairs, have a capacity of 250 cars and allow proper spacing so that workmen can conveniently make necessary repairs. On these tracks men are engaged in general cleaning, inspecting and making light or running repairs.

Cars are spotted in this yard by a switcher. During rush seasons it is necessary to have the tracks switched once or twice daily to handle the volume of cars.

Cars inspected on light-repair tracks and found to be in need of heavy or general repairs are switched to tracks in the heavy repair yard where the car body is removed from the underframe and placed on suitable supports. The trucks and underframes are then repaired and the body of the car is again placed on the underframe and then any necessary attention is given



Perishable Block Moving on the Southern Pacific

material has been properly reclaimed the lumber is cut to desired lengths and neatly piled; bolts, nuts, etc., are sorted in bins; galvanized-iron parts are cut in desired shapes and sizes, and all held for future use. The underframe of the dismantled car is then switched to a track for entrance to the erecting shed where an entire new body is applied.

There are three tracks entering this shed, capable of accommodating a total of 36 cars in various stages of rebuilding. On each of the three tracks there are six stations, and at each station there is ample room for two cars properly spaced for efficient handling. The various operations at these stations are: Wooden subsills and floors applied; wooden superstructure, including ceiling of car, applied; outside course of insulation, siding and hardware applied; roof applied; inside courses of insulation, the lining and the side doors applied; bulkheads, ice tanks, floor racks and door packing applied.

After the car leaves the roofing station, it is given a coat of paint, and, on leaving the erecting shed, two additional coats of paint are applied. After the paint is thoroughly dry all necessary stenciling is applied and

to the superstructure.

Cars in need of rebuilt superstructure, after all repairs have been given to the underframe, are switched to the dismantling or stripping track where the entire superstructure is dismantled. At this dismantling point there is suitable, up-to-date equipment conveniently located for the reclamation of second-hand lumber and material removed from dismantled car.

These facilities include a lumber reclaim mill, bolt-threading machine, nut-tapping machine, shears, etc. After the ma-



Extensive Pacific Fruit Express Car Repair Operations at Los Angeles, Cal.



P.F.E. Central Office at Brawley, Cal.

the car is then gone over by the inspectors and follow-up men who make necessary inspections, test air brakes, hatch plugs and side doors, to see that the car is in satisfactory condition. After it is definitely determined that the car is in good working order, the side doors are sealed and it is ready to be sent into the loading territory.

In rebuilding cars, the work is laid out and workmen so stationed that the cars are moved periodically from one station to the next by a Fordson tractor.

The physical facilities at Los Angeles also include a woodworking mill, blacksmith and machine shop, galvanizing plant, paint mixing and storage shop, tin shop, fully equipped modern plant for reclamation and renovating of journal-box packing, office and store-room buildings, all in addition to the erecting shed already described. Each of the shops enumerated is equipped with the latest facilities available, and with machines operated by individual motors.

For the convenience and welfare of employees, suitable locker and washrooms are fully equipped with showers and running hot and cold water. For the employees and their families there is a welfare or social hall where the most up-to-date kitchen equipment is installed. The handling of this hall is governed by a committee of employees, a new governing body being selected each year. At this building hot meals are served during the lunch period at a nominal cost and at times the building is utilized in the evenings for employees' gatherings, for dances, card parties and other forms of entertainment.

* * *



The Santa Fe Station at San Diego, Cal.

More Light for Dispatchers

IN the new dispatchers' office of the Maine Central at Portland, Me., the importance of promoting efficiency by protecting the dispatchers' eyes has been recognized. Two large north windows and seven west windows supply the illumination in the daytime, while numerous overhead lights provide for night work. In addition, all train sheets are printed on a special grade of light yellow paper, which absorbs the glare from daylight or artificial light, while at the same time providing a smooth writing surface. Markings made on this paper are more legible and distinct than on white paper, since no glare is reflected on the surface.

Roominess and cleanliness are also important in offices that are occupied for 24 hours each day. The dispatching room is 25 ft. by 30 ft., and is situated on the



The New Maine Central Dispatchers' Office Is Roomy and Light

first floor of the general office building. It is equipped with art-metal desks, designed for dispatchers' needs. The racks on top of the desk are also of art-metal.

This office takes care of an unusual amount of mileage, covering a total of 630 miles, of which 565 miles are single track. Three train dispatchers and a chief dispatcher handle each eight-hour trick. Two of the trick dispatchers handle 180 miles of line each, while the third handles 270 miles of somewhat lighter traffic territory.

THE ASSOCIATION OF RAILWAY SURGEONS of the Baltimore & Ohio held its thirty-eighth annual convention at Washington, D. C., on Wednesday, Thursday and Friday June 5-7. The number in attendance was about 300.

L. W. BALDWIN, president of the Missouri Pacific, has been elected a member of the committee which will determine the first recipient of the Clausen medal which is to be awarded annually by the American Association of Engineers to the individual who performs the most distinguished service for the welfare of the engineer, either social or economic.

The Union Pacific Buys Scientifically



Standards feature operations—Over ninety per cent of purchases expedited by advance agreements



Above—Council Bluffs Store. Below—A Tie Seasoning Yard

FOUR years ago there was published in the *Railway Age*,* a series of articles dealing with the reorganization of the supply work on the Union Pacific Lines and describing the facilities and methods for handling material and controlling inventories that caused these articles to be quoted in other parts of the world. At a time like the present, when closer attention is given by managements to purchasing as a means of conserving earnings and avoiding the wastes that eat into narrowing margins of profit, it may also be said that Union Pacific purchasing is deserving of study.

Spends \$75,000,000 Yearly

In a 12 months' period, this system spends in the neighborhood of seventy-five million dollars for materials and equipment. About \$12,000,000 of this is for locomotives, cars and miscellaneous equipment; \$13,000,000 for coal; \$1,500,000 for fuel oil; \$4,500,000 for ties; \$2,500,000 for lumber; \$2,000,000 for rail and \$29,500,000 for upwards of 75,000 varieties and sizes of miscellaneous materials commonly known as stores stock. Excepting coal, which is obtained from mines on the Union Pacific lines, and a few miscellaneous materials, the supplies represented by these expenditures are bought in the country's markets. The purchases include about 40,000 tons of rail, 3,000,000 ties and 64,000,000 ft. of lumber, while representative of the quantities of miscellaneous items bought yearly are 65,000 cast iron wheels, 4,700 car axles, 10,000 couplers, 34,000 brooms and 29,000 valves of various kinds. The road buys 139,000

handles for tools, 4,000 locomotive tires, 3,500 tons of track spikes, 6,000 tons of tie plates, 5,000 spark plugs, 1,000,000 ft. of boiler tubes, 11,000 kegs of nails, 2,000,000 lb. of soda ash for water softening and 50,000 lb. of tool steel. Upwards of 60,000 orders are issued in a year's time for these purchases, or an average of 200 a day, and as many as 5,300 firms participate in the business, which extends to 591 cities and towns in 45 of the 48 states in the union.

In transacting a business involving so large an aggregate expenditure and divided among so many things and places, there must be organization and system. Union Pacific practice is distinctive for the success in putting purchasing on a scientific basis. Practically everything sold to the Union Pacific must conform to predetermined standards of quality and through a system of term contracts carefully prepared, over 90 per cent of the purchasing can be done almost on a moment's notice. A locomotive is a complicated machine, but even a locomotive can be bought, built and delivered at the most advantageous prices in the time it would otherwise take to place an order, so systematically has this road organized its buying work.

Co-ordinated Buying

There are five units of the Union Pacific System, the Union Pacific Railroad, the St. Joseph & Grand Island, the Los Angeles & Salt Lake, the Oregon Short Line and the Oregon-Washington Railroad & Navigation Company. For corporate purposes, each of these units, excepting the St. Joseph & Grand Island, is operated under a separate management and has its own purchas-

* May 9, 16 and 30, 1925.



A Supply Train on the Union Pacific Lines

ing and stores organization. The purchasing department of the Union Pacific Railroad is stationed at Omaha, that of the Los Angeles & Salt Lake at Los Angeles, Cal., that of the Oregon Short Line at Salt Lake City, Utah, and that of the Oregon-Washington Railroad & Navigation Company at Portland, Ore., while the same cities are the headquarters of the respective stores departments. The purchasing departments are co-ordinated through a general purchasing agent and the stores departments through a general supervisor of stores, while co-ordination between the two departments and all other departments is secured through an assistant to the president in charge of purchasing and stores, engineering, and standards of all kinds, including mechanical.

The requirements for locomotives and cars and other large equipment programs, and also the requirements for coal, fuel, rail, ties, and the lumber for bridge and building programs, are determined by special studies each year and are usually organized on a yearly basis. For this reason and also because such programs call for executive action, this equipment and material for the system is bought under the direct supervision of the assistant to the president, assisted by the general purchasing agent. Because of this method of handling, and also because considerations of tie seasoning and treatment have led to the establishment of large storage yards at three points on the system, ties and lumber for roadway programs are not necessarily bought in accordance with immediate requirements, but instead are purchased equally with a view to market conditions.

Ride With the Market

In all other lines of purchasing, however, the Union Pacific follows the policy of "riding with the market"; that is, of meeting the requirements as they develop, regardless of fluctuations in price levels. In this branch of buying, purchases are made directly by the purchasing agents of the separate properties. However, the effort is made as far as possible to buy these miscellaneous or maintenance stocks under term contracts on the theory that all purchasing is thereby expedited and uniformity of manufacture facilitated. These contracts, numbering 425 and covering the purchase of 92 per cent of all expenditures for miscellaneous materials, are prepared by the general purchasing agent, and though different contracts for like material may be made for the different roads, they govern the conditions under which each purchasing agent buys the materials covered. In addition,

all orders for any special tools or equipment involving an expenditure of \$500 or more must receive the approval of the general purchasing agent.

One of the greatest obstacles to economical purchasing is the practice of users of material to order without regard to the supplies already held in stock or without regard to the standard practices in effect or in process of revision. Such practices interrupt orderly purchasing procedure. Delayed deliveries result from the confusion over description. Transportation costs are enlarged by special shipping in small quantities and the road becomes cluttered with surplus, if not slow-moving or useless, materials, all of which cost money.

Everything Standardized

In observing how these problems are met on the Union Pacific, attention is first directed to the users of material who, being the originators of orders, are correspondingly the source of some of the troubles which beset a railway in buying. Primarily for its value in maintenance operations, but also with a view to purchasing and other supply work, this road has for years been diligently engaged in adopting standards for maintenance and construction. The aim has been to have a standard for practically everything that is used or built, and to make the standard uniform over the system. In the maintenance and construction departments, they are called engineering standards; in the equipment department, mechanical standards. The roadway department, for example, has a standard crossing sign which prescribes by drawing how every crossing sign shall be constructed and gives the sizes, names and kinds of material used. The same is true of a switch, a water can, a material rack or any standard building.

The standard may start as a suggestion from headquarters or from a track or shopman as a result of seeing an advertisement, reading a magazine or hearing a report at a national or local convention, or as the result of a conference with a manufacturer. The suggested standard may be merely a certain form of construction or it may be a specification or a proprietary device or article. If it is a proposed engineering standard, it is referred, formally or otherwise, by the general manager of the road on which it originates, to the standard committee on engineering standards, of which the chief engineer is chairman. If a mechanical standard, it is referred to the mechanical committee, of which the superintendent of motive power is the chairman.

If the proposed standard involves the use of materials which must be obtained through the stores, the general supervisor of stores may suggest sizes that would serve the supply interests without defeating the purpose of the standard. If the material must be manufactured, the manufacturer is consulted, it being one of the cardinal principles of the Union Pacific buying that all standards should be commercially practicable. If the standard involves purchasing, the purchasing department is consulted. Invariably where a standard is proposed to govern the purchasing of a patented article or machine, it is required that wherever physically possible, one or more alternate standards be adopted to serve the road's interest

standardizing descriptions appearing on orders, limiting repair parts to those which are commercially practicable and facilitating the accurate estimating of quantities.

Another process which has been serviceable in purchasing, as well as beneficial to the maintenance departments of the road, is the effort made both in conjunction with and separate from the development of specific standards, to reduce the variety of sizes and kinds of articles required for a given purpose. In all standardizing, caution is used to avoid stifling progress. The need for variety and the necessity of keeping progressive is stressed. The Union Pacific is constantly building structures or buying equipment that are radical departures from all their predecessors. It is explained that standardizing is limited to securing uniformity where other considerations advise or, at least, allow it. When allowable, however, the effort is made in modernizing and standardizing to simplify. It is significant of the progress in this direction that the last of the Union Pacific's old locomotives has disappeared and that rail joints have been reduced from a large number of patterns to three. The effect in purchasing is to save the road from buying obsolete parts at high prices and to reduce purchasing to those articles

The image displays a collection of Union Pacific purchasing forms. Visible titles include:

- PURCHASE AGREEMENT**
- STANDARD SPECIFICATION U. S. 1**
- STOREKEEPER'S REQUISITION FOR MATERIAL TO BE PURCHASED**
- ABSTRACT OF PROPOSALS TO FURNISH MATERIAL**
- TELEPHONE QUOTATIONS**
- PRICE CARD**

 The forms are arranged in an overlapping fashion, showing their layout and content.

Left to Right—Union Pacific Purchase Agreement, Standard Specification, Requisition Form, Price Inquiry Form, Price Tabulation Form, Purchase Order Form, Contract Record, Telephone Order Form, and Price Card.

at all times in preserving competition. Thus, if a certain make of truck bolster is adopted as the standard for all new equipment, one or more other types of bolsters are agreed upon as alternates to be specified if rapid production of the preferred make should be impossible or the price unreasonably out of line at the time of purchase.

Establishing the Standards

The standards become effective when they have been approved by the president through the assistant to the president, and they are printed and distributed to all parties concerned and thereafter continue in full effect until rescinded or superceded by revision. There are 400 maintenance of way standards at present, also a standard for every part of a car or locomotive in use. In addition there are 126 specifications to control manufacture. It is estimated that the use of standards has reduced maintenance expenditures at least 10 per cent by facilitating construction and repair operations, but their value in purchasing has also been large through

or materials which can be bought at any time in economical quantities.

Additional steps preliminary to purchasing on the Union Pacific are the practices, first, of requiring the use of a standard form by all persons ordering material, and second, to have all orders pass through the stores department. The stores department is the custodian of all unapplied materials. These may not all be at one point or even at different stores but all materials kept on hand are standardized over the system and recorded in stock books which list all items by definite classes, describe them in approved form, including references to pattern numbers, or specifications required in purchasing, and also state the quantity available for use at each point as determined by a monthly count. They also show by appropriate marking kept up-to-date when the purchasing of any item is discontinued.

Each division and general store has a stock book showing all material carried and monthly requisitions for purchase are based upon the actual count of such ma-

terial. Coupons showing this information are detached from the stock books and mailed to the office of the general supervisor of stores at Omaha, where carbon copies of all purchase requisitions are forwarded to be checked against material on hand. By requiring that all requisitions pass through this channel, it is thus possible to determine first, whether the material is standard, second, whether it is properly described and third, whether it can be supplied from existing stock.

Bulk Buying Made Possible

These books also serve another purpose by showing how the material is to be secured. In the interests of economy, it may have been decided to make certain items in the company's shops or to obtain them from reclamation plants, thus dispensing altogether with purchasing. Again the Union Pacific, remotely situated as parts of it are from purchasing areas, is vitally interested in buying in as large quantities as possible to get cheaper prices as well as to save freight bills and rehandling costs by avoiding back haul. Primarily for these purposes, each division store point is required to send all of its requisitions for material to the general store while certain general stores in turn are supply points for other units of the system, as recorded in the stock books opposite the items concerned. Thus the general store at Omaha is a system supply point for a large variety of materials secured in eastern markets, while the general store at Portland, Ore., is a supply depot for maintenance of way lumber and ties. In such cases, the stores department will not replenish stock by ordering on the purchasing agent direct, but sends its requisitions to the stores department of the road designated. A single store may thus bulk all the orders for certain requirements into one.

The way for orderly and economical purchasing is further prepared by the practice of the stores to divide the ordering of material into classes and distribute them over the month under fixed schedules. An order on the purchasing department for material calls for as many items as can be written upon it to save clerical time, but all the items on such an order belong in the same class of material. Under this plan, the purchasing department receives and can usually concentrate on certain classes of material one day and on other classes another day as they are forwarded by the general stores. There is no clogging of the purchasing machine and each order receives attention with the greatest dispatch and the least confusion.

Simplified Office Practice

The storekeeper's requisition is a ruled sheet adopted both for ordering material and as the purchasing department's record of purchase and receipt. It shows for each item, the quantity required, the standard description and the destination, and a column is also provided for the estimated value of the item for the guidance of the general storekeeper in checking the requisition. In addition, the order provides columns in which the purchasing department can subsequently keep an office record of purchase and shipment.

The first step in the purchasing department when orders reach the office is to determine whether the purchasing of the material is covered by contract with designated firms. It is not necessary to search for the complete contract. Reference is simply made to a file in which cards are arranged alphabetically by material. If a contract exists, the procedure is to make an order on the contractor, whose proper name and address is quickly obtained in a second card file where the contracts are listed by firm names. If the material is not covered by a contract, an inquiry is sent out to an approved list of firms carried on file and the order is held until the

prices offered by competing firms have been received, tabulated on the standard form and the successful firm or firms has been determined by the purchasing agent. As soon as an order is prepared, the original requisition is marked with the name of the shipper and the date and number of the purchase order.

The originating storekeeper knows when and from whom the material was purchased because he receives a copy of the purchase order, and the use of the storekeeper's number by the purchasing department enables the storekeeper to identify the order without trouble. When the material is shipped, it carries the same order and class number of material and the quantity can readily be checked against the original requisition. Also, when the bill is received, it carries the storekeeper's number and when certified by the store keeper and returned to the purchasing agent, the latter simply checks the prices against the original agreement, enters a record on the store requisitions that are kept in a book for the purpose and forwards the invoice with its copy of the purchase order to the auditing department. The purchasing department does not keep a separate invoice record, the use of a store requisition having eliminated the necessity for it. Where contracts exist, orders are placed within two days after requisitions are received, as compared with an average of eight days where inquiries are required.

Quality Assured by Inspection

Consistent with the policy, under which the Union Pacific operates, of purchasing on the basis of well developed standards, the bulk of all purchases is subject to inspection. In the majority of instances, shipping point inspection is required and no purchases, whether they consist of locomotives, tie plates or other materials, may be made until the materials have passed inspection. This inspection may involve the chemical or physical analysis of material. It may be limited to measurements or it may extend to an inspection of the process of manufacture and assembly. The kind and scope of the inspection is stipulated in the purchase order.

All lumber and ties are inspected by forces in the purchasing department. Since most of the ties are bought by the purchasing agent of the Oregon-Washington Railroad & Navigation Company, the largest inspection force is maintained there, but the other purchasing agents also have corps of inspectors. All other inspection is carried out under the direction of a bureau of inspection in charge of a special engineer and the work is performed either directly by this organization or in the Union Pacific laboratories or by an independent inspection bureau, as prescribed.

The order for material notifies the vendor regarding inspection. With maintenance materials this is usually done by a rubber stamp which prescribes that shipment can not be made until authorized by the designated inspection bureau. At the same time the inspection bureau is informed of the purchase by receiving a copy of the purchase order. The shipment is released upon receipt of the inspector's report, which is forwarded to the purchasing department with the bill. The division storekeeper's copy of the purchase order notifies him regarding inspection and thus places him on guard against certifying bills until the inspection report is received.

Honesty in Business

Since contracts figure so prominently in Union Pacific buying, their preparation and the policies behind them invite attention. These contracts are made with deliberation and are detailed. The substance of the agreement

usually is to furnish the specified materials "as the company may desire to purchase them" over a stipulated period and they contain clauses stipulating the conditions and delivery, the quality and workmanship required, also instructions covering packing and cartage, protection against patent suits, engineering service, terms of payment, scale of prices, etc., and contain full plans and drawings and specifications covering the different items considered.

It is emphasized that these contracts do not stifle competition. On the contrary they are said to foster it and at the same time to assure other advantages to the railroad not obtainable where purchasing is done on a hand-to-mouth basis. A distinction is made between constructive and destructive competition. The one is obtained where the volume of business by the buyer is sufficient to encourage responsible sellers really to strive for it and where time is afforded for thorough investigations of all contingencies that leave no room for failures in performance. The other results where the business is placed piecemeal with little forethought for details and only after haggling that often serves but to delay the transaction and inspire reactionary cycles.

It is stressed that in making these contracts, efficiency and economy in the road's operations are distinctly watchwords and that they preserve the principles of honesty and fair dealing in business of which the Union Pacific is an exponent. No effort is made to give any vendor an unfair advantage of another. Bids are not sought from persons from whom there is predetermined intention not to buy. Every bidder is equally informed of the conditions of a purchase with assurance also that in consideration of the performance on his part in accordance with the spirit of the contract, the road will live up to the spirit of its obligations. By these contracts, which clearly set forth the terms of the agreement and all details concerning purchase arrangements, the purchasing is put on a factual basis. Quality is preserved, prices are the best obtainable and the dispatch in purchasing and receiving is assured. The history of this contract buying on the Union Pacific dates back to 1905 and it is significant of this road's convictions in their favor that contracts have been increased from approximately 200 prior to the war to 425 at present.

Precise Equipment Buying

The science and system in Union Pacific buying is best illustrated in the purchasing of locomotives and cars or other special equipment. Such equipment is not bought at the ready-made counter, but is rather a job for the tailor to be performed with a view to 10 to 20 years of service during which the critical demands of an uncertain future must be met. Moreover, as the curves of business and revenue turn sharply upward, the demand for new equipment often crystallizes quickly and there is a hurry to get production, but even where the need for such equipment is not so pressing, the large cost represented by single units and the imposing cost of the large number of units usually involved advises careful buying and planning. An attractive reduction in interest charges alone is often made possible by rapid completion of the work.

Recognizing these conditions, the Union Pacific does not wait for formal executive action before interesting itself in the next purchase of equipment. Instead, it is constantly at work planning its next locomotive or car, and by keeping in touch with its transportation problems, observing the weak points of existing equipment, consulting with manufacturers, and remembering experiences with previous equipment, mechanical experts, co-ordinating with those in charge of standards,

construct on paper the type of equipment to be built. Detailed plans and specifications of each part, including all facilities and alternate standards, are prepared and listed in appropriate schedules which leave little to the builder's imagination.

Put Prices on Pound Basis

Meanwhile the purchasing department keeps records of the cost of previous equipment bought, also charts showing the trend of prices for the basic commodities from which locomotives or other equipment are made, and in addition, such records of unfilled orders at mills are kept that will indicate building capacity at any period. Coincidentally the department proceeds with the preparation of inquiry forms and agreements that will supply builders with full information needed for their proposals. Under this procedure an inquiry for bids, complete in all details, can be submitted to bidders within a day or two after a building program has been authorized, though such a program may involve the expenditure of a million dollars or more.

To expedite bidding, all specialty manufacturers concerned are notified directly to anticipate requests for quotations from specified builders and when the bids are received and consultations held, the railroad is prepared to judge the proposals intelligently. In the first place, the reasonableness of prices proposed by bidders is tested by the comparison which the total proposed cost bears to previous costs and also the relation which the total cost reduced to a cost per lb. basis bears to the trend of locomotive or car costs, on such a basis. In addition to this, the form in which proposals are received makes it possible to separate equipment into its parts and to check the price of each part against the market price of the basic materials from which they are made, after adding a reasonable percentage for labor, plant overhead and profit.

Frequently as an inducement to railroads to specify their products, manufacturers will charge a railroad less for the specialties than the builders. To meet this contingency, the inquiries are always arranged to show the reductions in the bid which will be allowed by the builder of equipments for specialties furnished by the railroad. It is also recognized that the heavy demand for specialties at the time of purchase may affect the prices, especially if other choices are not made, and to meet this situation, the proposals also give the railroad a comparison between the cost to use the preferred standards or the alternate standards. It is not difficult, with these measures, to place equipment orders quickly, assure prompt production and get the equipment into service under conditions satisfactory to the builder and with economy to the railroad.

* * *



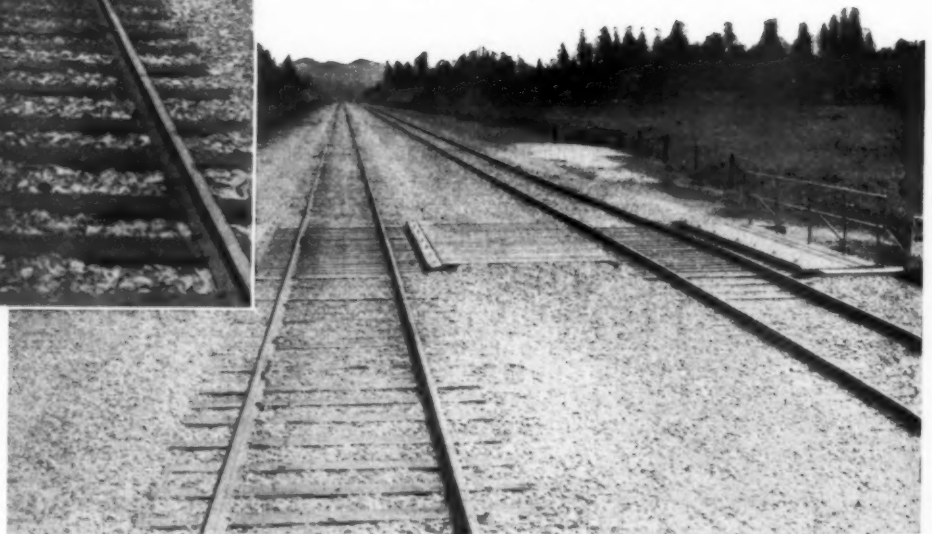
Main Power Plant for the Electrified Section of the New Haven at Cos Cob, Conn.

The Western Pacific



Upper—Bank widening and rock ballasting in the Feather River Canyon

Lower—Bank widening, rock ballast and a new passing track in California



Entire line under vigorous improvement program—machine methods save labor and speed work

THE Western Pacific is now carrying out an extensive program of improvement of its main line between Salt Lake City, Utah, and Oakland, Cal., via the picturesque canyon of the Feather river. This program is independent of activities looking to the building or acquiring of some 270 miles of feeder lines and connections in California, but it is quite as imposing for the vigor with which it is being pushed. It consists of bank widening, ballasting, renewing and increasing the number of ties, laying of new rail, the application of tie plates and anchors, the construction and extension of side tracks, also bridge construction, bank protection work, new and improved section and station facilities, and painting.

This program, which was begun in 1927 as one of the results in the change of control of the property, marks a new era in the history of the Western Pacific. The program covers a period of six years or more and involves an expenditure of approximately eighteen million dollars. When the line was built 21 years ago, it was well located from an engineering standpoint. Though the longer route between Salt Lake City and

San Francisco, it crosses the formidable Sierras at the remarkably low elevation of 5,000 ft. The curves are numerous through the mountains, but the degree of curvature is not severe at any point and ruling grades are within a maximum of one per cent compensated. There are numerous tunnels, as many as 33 occurring in one stretch of 116 miles, but the location saved the road from the necessity of building and maintaining snow sheds. That the road was substantially built, moreover, is indicated by the prevalence of steel and concrete over wood in bridges, trestles and culverts. Of the 45,588 lin. ft. of tunnel, 9,841 ft. is in solid rock which requires no lining, and 13,612 ft. is lined with concrete.

More Traffic Calls for Better Track

However, while appropriations might have been adequate to keep the track in good condition for the initial tonnage, they were not adequate for the tonnage the Western Pacific had begun to meet and hope for, and both the appearance and condition of the tracks suffered. In 1924, 178 route miles of line in Nevada

ficDresses Up

were improved between Winnemucca and Wells as a result of an agreement made with the Southern Pacific under which the Western Pacific track between these points is used as the east bound main line for both roads. A drive to put this track in condition for heavier and more exacting operations was made and completed within the time scheduled, and the improvement program now being carried out is to bring the remainder of the line up to equal or higher standards.

The roadbed is being widened to give a minimum section of 20 ft. from shoulder to shoulder after shrinkage. The track is being raised a minimum of 8 in. and gravel or crushed rock applied to secure a ballast section of 9 ft. 8 in. on the top and 15 ft. 8 in. on the bottom. The use of 7-in. by 8-in. by 8-ft. untreated ties is continued, but the number is increased from 3,000 to 3,200 a mile. The Western Pacific has been using an 85-lb. rail having an unusually high head. The experience with this rail has been good, and with the wider banks and ballasting, this rail is expected to prove satisfactory for some time to come. Replacement is, therefore, being made with the same section, but the new rail is 39 ft. long.

Four-hole heat-treated angle bars replace untreated bars; tie plates, instead of being confined to curves, are being extended to all tracks; an 8-in. by 9-in. canted plate with a compression type bottom is being substituted for the old style flat top and ribbed bottom plate; $\frac{5}{8}$ -in. by 6-in. spikes are replacing $\frac{7}{16}$ -in. by $5\frac{1}{2}$ -in. spikes; carbon bolts have given way to heat-treated bolts; and old style nut locks, to spring washers; while to these standards, anchors have been added, 8 to 20 to the panel.

The improvement program provides for increasing existing passing track capacities over 30 per cent by



A Gravel Ballasted Section on the Desert East of Wendover, Utah

extending 48 passing tracks and then increasing this trackage over 10 per cent by building 16 new passing tracks, a program which has largely been completed.

The kind and extent of bridge improvement work is indicated by the construction of 38 steel bridges of one or more spans, and 27 reinforced concrete or concrete-encased steel structures, as follows:

- 30 60-ft. and 175-ft. steel spans
- 1 166-ft. skewed span
- 1 210-ft. drawbridge with 80-ft. and 100-ft. through girder approaches
- 1 450-ft. steel viaduct
- 1 375-ft. steel viaduct
- 4 150-ft. and 2 100-ft. through steel spans
- 1 66-ft. through highway crossing
- 6 concrete subways with 24 to 30-ft. spans
- 2 20-ft. subways
- 8 30-ft. ballast deck openings
- 3 20-ft. ballast deck openings
- 2 17-ft. ballast deck openings
- 4 15-ft. ballast deck openings
- 2 concrete viaducts



Main Line in Upper End of Feather River Canyon Where Bank Widening and Rock Ballasting Was Completed this Year

The program contemplates replacing all timber lining in tunnels with concrete as rapidly as it can be done, the final step being to concrete all the timber portals, which work includes, however, the placing of not less than 50 ft. of concrete lining in each case.

The program also includes the replacing of log cribs built during the construction period as stream protection. These cribs are being replaced either with concrete-retaining walls or heavy rip rap, and the work will be practically completed this year.

Much of the water supply for the Western Pacific is obtained by gravity. The three main supplies, located at Gerlach, Nev., and at Wendover, Utah, and Delle, are delivered from springs through six and eight-inch pipe lines, 15 to 20 miles long, and as a part of the program, approximately 40 per cent of these lines, including wood stave construction, have been replaced with cast or wrought iron pipe.

Complete 59 Per Cent in Five Years

The Western Pacific is only 1,000 miles long but it is indicative of the size of the present program that with this year's work, the road will have widened 59 per cent of its line to the new standard, ballasted 45 per cent with rock or gravel, and relaid or changed rail on 20 per cent. In a single season, it has operated as many as 13 work trains. As many as five steam shovels have been loading gravel or crushed rock and as many as 800 men have been engaged at one time in ballasting and bank widening operations alone. The road has virtually been plowing about three and one-half million dollars a year back into the property or about nineteen per cent of its gross revenues.

Latest Machinery Used

In these operations the work done by machine and power tools is large. In addition to the work trains with Lidgerwood equipments and 4 steam shovels, there are 2 ditchers, 100 Hart Selective ballast cars among several hundred of other types, 40 automatic air dump cars, 3 rail laying machines, two 12-tool and one 8-tool air compressors with 32 tie tampers, 3 spike drivers and 2



Main Line in California After Rail Change, Widening and Ballasting

nutters. This does not include two gas driven electric welding machines for building up battered rail joints and a generous equipment of motor cars and smaller tools. Modern equipment was acquired for the purpose and by time studies and cost reports, every move has been organized to make the fullest use of it. As a result of these methods, 270-men gangs have been ballasting track at the rate of 1,900 ft. a day in gravel ballast, gangs of 234 men have been proceeding at the rate of 1,400 ft. daily in crushed rock ballast, while this year, a crew of 110 men relaid rail, renewed ties, etc., at the rate of 4,161 track ft. daily for a period of four months.

The plan in this program has not been to relay rail

before or after bank widening or ballasting, necessarily, nor to complete one section before undertaking work elsewhere, but rather to distribute the work in accordance with the immediate needs and to spread it so that it can be done with the greatest expedition and economy. Thus while rail renewal had been confined to 185 miles of line up to the end of 1928, a total of 297 miles of ballasting had been completed and 425 miles of bank widening. Rail renewals, moreover, were confined generally to three sections as compared with five sections of ballasting and eight sections of bank widening. Two sections, one 40 miles long in Utah, and one 60 miles long in California, had been completely widened, ballasted and relaid at the close of 1928, while completed ballasting and bank widening alone was confined to four sections, or a total of about three hundred miles. This year's program further illustrates the plan or work by calling for 119 miles of bank widening in three sections and 120 miles of ballasting in four sections. When this year's program is completed, however, 100 miles of line from Oakland east to Stockton will have been completely widened, rock ballasted and relaid, while bank widening and ballasting will have been completed elsewhere on a total of approximately 317 miles in six sections.

The volume and the distribution of the work for any year are developed from surveys made in the fall. A. F. E.'s. are issued by January and the work organ-



A Surfacing Gang at Work With Air Tamping Tools—Note Small Area of Track Occupied



Crossing the Great Salt Lake Where Rip Rap Has Been Placed Preparatory to Widening and Ballasting

ized to begin as early in the spring as seasonal conditions permit.

Bank Widening by Machine

As bank widening is almost entirely a machine operation, the work is organized to assure that all preparatory work necessary to the widening is completed well in advance. This includes extending culverts, raising and widening bulkheads of trestles and bridges, and the removal of all signs or other obstructions to the free movement of spreader machines. A total of 126,000 cu. yd. of heavy rock was distributed over 10 miles on the line out of Salt Lake City to protect the roadbed from wave action where it crosses the southerly end of the Great Salt Lake and this rock was also unloaded and spread before bank widening was begun.

Shallow earth cuts are prepared for widening by operating spreader ditchers through them often enough to remove all material necessary to obtain the standard ditch and cut section. In these operations the spreader wings are carried in position for side sloping. Where such cuts were already wide and the quantity of material considerable, the spreader wings are swung into the carrier position and the material dragged to adjacent fills. The spreader is then set in carrier position and run over all fills, cutting the shoulder down to 15 in. below the top of the ties. While the spreaders are employed in this work, ditchers clean out and widen all of the deeper cuts, the material being dumped on adjacent fills.

After the preliminary work is completed, bank widening material is hauled in work trains of from 30 to 40 cars each and unloaded by Lidgerwoods, except in the case of high fills where air-dump cars are used. A Jordan spreader, of which the Western Pacific has five, levels off the material. Enough material is unloaded in each case for the required set-offs for hand cars, rail rests, signs and platforms. In widening banks, care is taken to avoid unloading excessive amounts of material and this interest is served by doing the work in stages. Usually from two to four dumpings are made, followed in each case by the spreader which is always operated with the wings in the carrier position, that is, with the end of each wing swung parallel to the track at the proper distance to form the shoulder line of the bank, thereby building a shoulder line as straight as though dressed by hand.

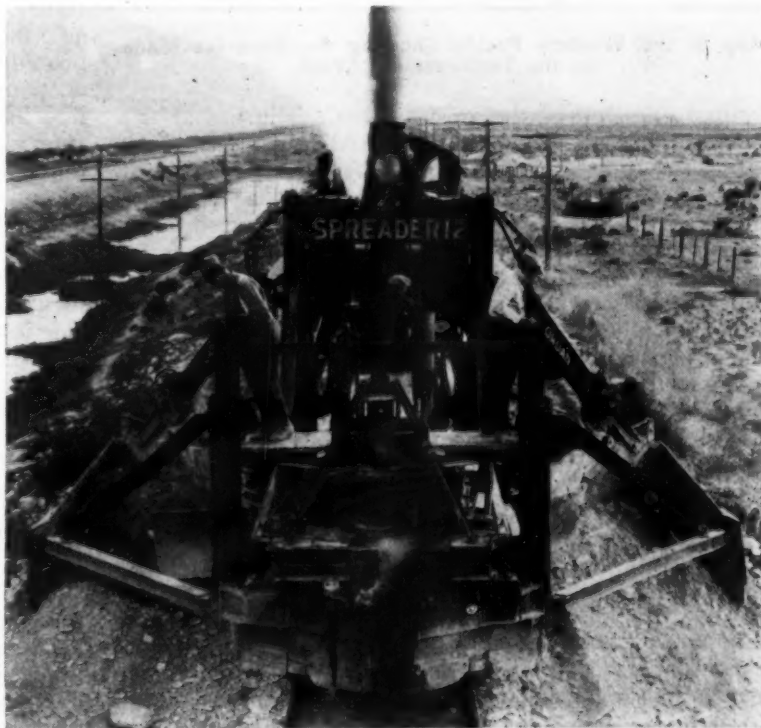
The pits from which the bank widening material is secured, are all on the railroad and are selected to reduce the haul to the minimum, but, as far as possible, advantage is taken of the need for material to establish the pits where they will also serve to widen deep cuts or cut down those banks which

obstruct the view of train crews in operating trains.

The material for bank widening thus far has been handled from 5 miles to 30 miles or an average of about 10 miles. In order to get the best results from train crews and particularly to avoid their delaying the track work, the general foreman in charge of all pit operations for both bank widening and ballasting is a conductor. An experienced roadmaster looks after the unloading and spreading operations and also the arrangement of tracks in the pit.

Ballasting Shows Study

Preparatory to ballasting, a skeletonizing gang removes all material between the ties down to the bottom of the ties and spreads it on the shoulders for sub-ballast. At the approaches to tunnels or bridges and through streets where the track can not be given the required raise, the skeletonizing gang digs down in order to get the proper depth for the ballasting. Wooden trestles are ordinarily raised to meet the new grade line and other necessary bridge work is done slightly in advance of the ballasting or with the first raise operation. After skeletonizing the track, the gang respaces the ties to the new standard and renews them in sufficient number to practically obviate any need of making tie renewals for two years following the ballasting. Switch ties are also renewed and all heavy lining required in the track is done at this time.



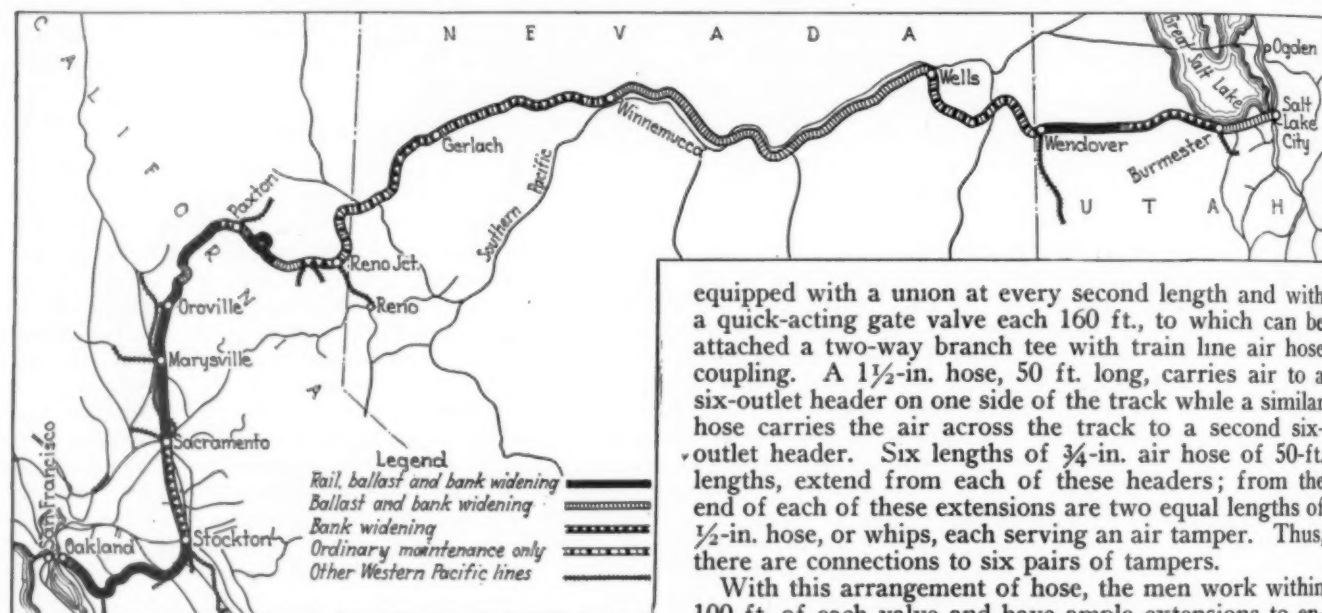
A Spreader with the Carrier Wings in Position for Bank Widening

The skeletonizing gang is followed by a gang which raises the track to the required elevation and places the first ballast under, this gang being followed by a final raise and dressing gang. The track is filled with the first distribution of ballast, raised by track jacks to the level of the grade stakes and given its first tamping. In making this first raise, two sets of jacks are used to avoid damaging the rail and the tamping is done on both sides of the ties throughout their length rather than merely under the ends. Before the second lift of ballast is unloaded, the track is lined to the stakes and is then left undisturbed for a period of from two to eight weeks to allow traffic to compact it fully and develop all weak spots.

The track is then ready for the final raise which is done with tamping machines. Usually the traffic between the first raise and the final raise period results in a settlement of about 1½ in. and the track is raised

- 2 compressor operators
- 1 air-tool man
- 1 platform man out in front
- 4 jack men
- 4 men shovelling in for jacks
- 1 man handling the level
- 1 man to assist level man with maul
- 1 assistant foreman, spot board
- 2 men adjusting ties
- 4 men spotting up track behind jack gang
- 24 air tampers
- 4 men shoveling gravel for tampers
- 4 men handling air hose
- 1 hose man and relief tool man
- 64 Total

The equipment consists of two air compressors with 1,600 ft. of pipe line each and 24 air tamping tools. The first compressor is placed at one side of the track 1,600 ft. ahead of the starting point and is connected to a 2-in. pipe line that extends 1,600 ft. in each direction. This 3,200 ft. of pipe line is in 40-ft. sections



Map of the Western Pacific Showing the Progress Made in the Improvement Work

again to the top of the grade stakes. The ties at this time are tamped outside the rails and 15 in. inside each rail. This operation is followed by the final lining of the track and the unloading of enough ballast to insure the standard ballast section which is then dressed to the proper slope of shoulder and toe line.

Where enough ballast is available to keep the tamping machines busy, the dressing is done by a separate gang but where the supply of ballast is not sufficient, the practice is to add sufficient men to the final raise gang so that by proceeding a certain distance with the tamping, and then going back to assist in shaping and dressing, the entire gang can be kept busy, a plan which is considered better than to alter the arrangements of tamping.

Well Planned Tamping

A feature of the final raise operation is the arrangement for tamping. In addition to reducing the number of men required, the present plan also reduces the amount of track in process of lifting to 40 ft. as against the usual 200 or 300 ft. The standard final raise organization at present consists of 64 men, as follows:

- 1 foreman
- 2 flagmen
- 1 motor car operator
- 5 men to handle air pipe
- 1 water boy

equipped with a union at every second length and with a quick-acting gate valve each 160 ft., to which can be attached a two-way branch tee with train line air hose coupling. A 1½-in. hose, 50 ft. long, carries air to a six-outlet header on one side of the track while a similar hose carries the air across the track to a second six-outlet header. Six lengths of ¾-in. air hose of 50-ft. lengths, extend from each of these headers; from the end of each of these extensions are two equal lengths of ½-in. hose, or whips, each serving an air tamper. Thus, there are connections to six pairs of tampers.

With this arrangement of hose, the men work within 100 ft. of each valve and have ample extensions to enable them to do all work from one valve to another, the procedure being to work toward the branch pipe connection, which is then quickly disconnected and coupled into the main air line at the next gate valve. The first four men, two on one side of the track and two on the other side, tamp every third tie outside of the rail. The second four men tamp the same tie inside of the rail but follow six ties behind. The second crew of four outside men follow two ties behind these men, while six ties behind them are the corresponding crew of inside men; two ties behind these men the third crew of outside men follow and six ties behind them, the third crew of inside men. Each group of men thus works on every third tie, so stationed as to avoid interference.

Measure Work in Minutes

A pipe gang of one motor-car operator and five pipe men are equipped with a motor car and two trailers and as the tamping advances, the main air line is uncoupled in sections of 40 ft., loaded on the trailers and moved ahead 800 ft. at a time where it is relaid in the same order as it was taken up. This gang also moves the compressors as the work advances, all preparations, such as the building of set-offs for this moving, being done in advance. Usually one such move is made in a day and the work is so organized that the actual moving and setting up of a compressor takes only 20 min.

Previously, 102 men were required in the final raise gang, but it has been possible to reduce this number to 64 as a result of the more accurate unloading of ballast



A Typical Section Unit—Shower Baths in All Bunk Houses

and improvements made in the arrangement of machinery and the organization of the work. The average output of the final raise gang this year in rock ballasting was 2,240 track ft. each day while 2,640 track ft. represented the best day's work.

Attention to organization and methods has also resulted in improvements in the dressing operations. On rock ballast the cost of shaping has been noticeably reduced by the use of Jordan spreaders. The spreaders, equipped with ballast-sloping attachments, are operated to dress the ballast roughly previous to dressing by hand. In this operation templets of one-inch boards are laid to make a true toe line and where the final unloading is properly done by the use of Hart Selective ballast cars which will dump in the center or to the side in a way that can easily be controlled, it is not necessary to use push cars in distributing ballast and a toe line is secured that requires very little hand work. Where the dressing leaves a slight excess of ballast, this is placed on the shoulder but the amount is never allowed to offset the finished appearance of the ballast.

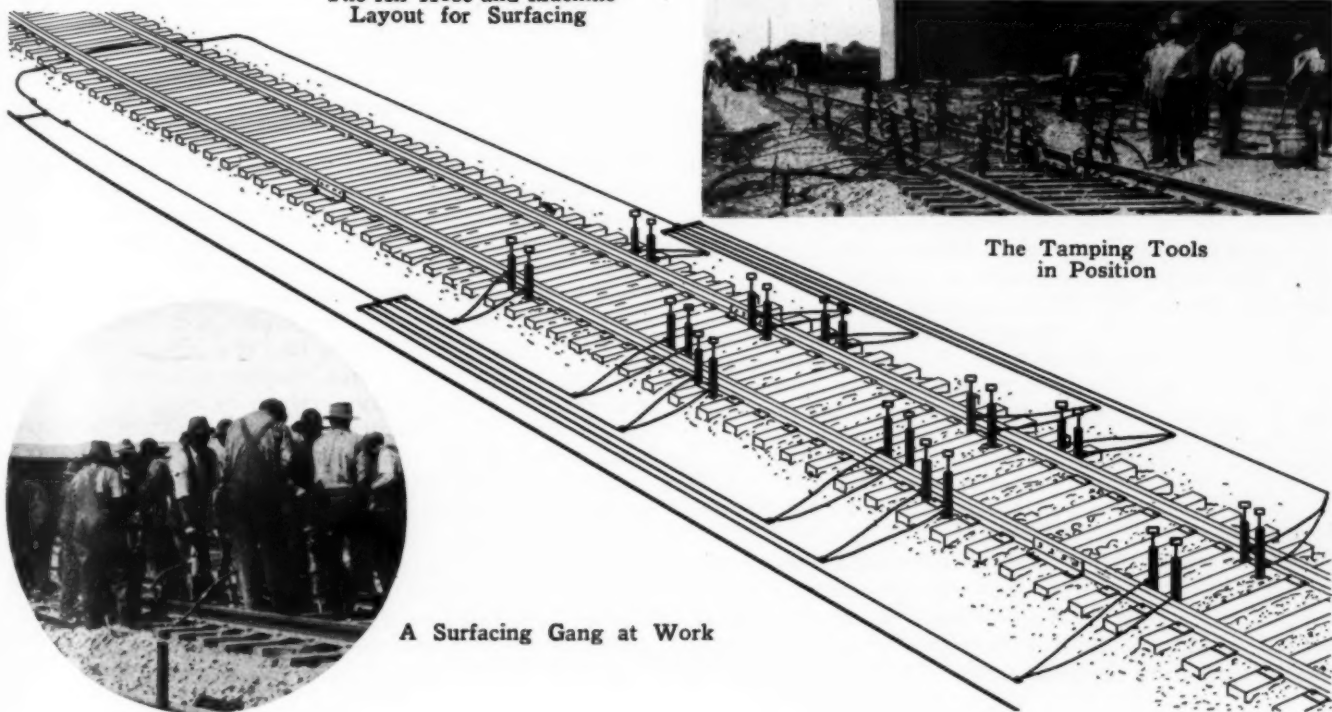
Sometimes when rough-dressing rock ballast with the spreader it is necessary to set the wings low enough to bring them in contact with the shoulders and if excess material is present it becomes fouled. Such excess is carried forward by the spreader into piles, which a

Burro crane, with a $\frac{3}{8}$ -yd. clamp shell, picks up for use as No. 2 ballast in side tracks. These cranes also prove equally useful in loading up surplus material resulting from the skeletonizing operations.

All rail laying work, has been done with the closest attention to speed and economy. This will appear from a description of the work on 82 miles of line east of Oakland, where new rail was laid at an average rate of 4,161 track feet daily.

This work, which like bank widening and ballasting was highly machined, was done by an average force of 135 men, divided into a rail-unloading-and-loading gang, consisting of 25 men, which operated well in advance of a rail laying gang of 110 men. The rail arrived on flat cars so that it could be shipped direct to the line and save rehandling at the store yard. Two Burro cranes operated across the top of the cars, moving as soon as one car was unloaded, to the next car and saved switching. One crane unloaded on one side of the track and the other on the opposite side, with the train moving about three miles per hour. The fastenings were unloaded at the same time as the rail. After the rail was laid the same gang, with these cranes, picked up the old rails and fastenings. The old rail was classified and marked in advance of picking up and was separated by classes on opposite sides of the cars as far as possible.

The Air Hose and Machine Layout for Surfacing



The Tamping Tools in Position

A Surfacing Gang at Work

The rail-laying gang of 110 men followed the practice of laying steel four or five days a week and spending the other days in distributing spikes, tie plates, bolts, placing one pair of angle bars on each rail with one bolt, doing all advance adzing and other advance work, and in relaying switches. In relaying the rail, the track was opened up on one side and the following organization was then followed:

1 flagman	12 men to spike every fourth tie
3 men to distribute plates, spikes and tie plugs	1 man to insert two bolts
2 men to pull spikes in every other tie	1 man to bring tools
4 men to pull balance of spikes	5 men to fix road crossings
2 men to break joints	3 men to adjust tie plates
1 assistant foreman	1 man to distribute spikes
8 men to push out old rail	5 men to start spikes
1 water-boy	2 men to break joints in old rails and start bolts
1 man to gather old tie plates	1 assistant foreman
5 men to insert and drive tie plugs	3 men to drive spikes
6 men to adze ties	2 men to handle air hose
3 men to place new tie plates	1 compressor operator
5 men to set in new rail	1 bolt runner
1 steel-gang foreman	1 man to handle air hose
1 crane operator	1 man to unscrew old bolts
3 men to insert bolts	1 man to handle air hose
15 men to gage and line	4 men to place rail anchors
1 water-boy	2 motor-car operators
	1 flagman

As soon as the old rail is thrown out, men sweep off the ties to be adzed and insert tie plugs. Two men follow, driving the plugs home. The ties are then adzed, new tie plates placed, the new rail laid in quick succession, and gage spikes driven; the gang laying an average of three rails a minute and having laid over 400 39-ft. rails in one day.

Spikes Driven by Air

The spikes are driven by air, supplied by a self-propelling compressor. By using three spiking hammers and also two machines for removing the old nuts from bolts and applying new nuts, it has been possible to close up the spiking and bolting each day. Five men insert the spikes in the ties, driving them by hand just far enough to keep them in upright position when the air hammers are placed on them, the spike setters using an 8-lb. striking hammer with a handle 12 in. long to permit the minimum number of operations. By removing the old nuts with a bolting machine, the old bolts are salvaged for use in ordinary renewals. The advance gang sees that all bolts are prepared for the nutting machines, and penetrating rust-removing oil is used so that the machines can remove all nuts rapidly. As the machines advance from one point to another, a standard track wrench is applied to the nuts to tighten them to the required tension. On days when steel is not being laid, the rail gangs are employed in general work, the small gang picking up all the tie plates and spikes from the center of the track and piling them on the shoulder for the rail-loading pick-up gang.

It is estimated that the use of the Burro cranes for setting in rail saves 15 men and the use of spike drivers and nutting machines 21 men, or a total of 36 men. On the 82½-mile job, 7,842 track feet was the best day's record and 5,429 track feet daily the best two weeks' record, while the average for the job was 4,161 track feet daily.

Weld Battered Joints

All rails not subject to relaying in the immediate future are inspected and the battered joints built up to the original section by electric welding and all track not included in the immediate improvement program is receiving the attention of extra gangs of from 15 to 20 men

in winter and 30 to 35 men in summer for each 120 miles of line, while to maintain this track and all newly laid and ballasted track section forces of 10 men are employed on each section.

The electric welding was begun five years ago. The organization consists of 21 men equipped with two gasoline-driven, electric-welding machines which are operated three shifts a day. All rail battered 1/32 in. is welded. The joints are surfaced and the angle bars replaced before the welding is started, and the procedure is then to chime out any cracked metal and weld until the original section is obtained as determined by applying an 18-in. straight edge on the rail being welded. The metal extending from 3 to 10 in. back from the joint, is compacted by continual handling during the welding and is finished by a power grinder. The work is paid for by the joint and has proceeded at the rate of 300 joints a day with the result that 350 miles of track have thus far been so treated.

To control the work, the foreman of all gangs engaged in bank widening, ballasting, rail laying or other work, are required to make daily reports, showing the amount of each kind of work done and the daily labor cost in each case. Once a week, the roadmasters get these reports from the foreman operating in their jurisdiction and a consolidated statement is prepared giving the cost of each type of work on each job, including, in addition to the gang labor, any other labor charges, the work train expense and material cost. These statements are furnished to the general officers, who can thus compare the accumulated cost of the work with the original allowance and also the performance of the gangs. It is significant of the use made of these reports that there has been a well defined tendency of unit costs to decrease as the jobs, under different foremen, progress. Irregularities in any report are investigated immediately and frequently result in disclosing some weakness in organization.

Good Homes for Labor

Careful attention is given to the comfort and health of the gangs. All outfits have portable fly-proof toilets, all garbage from kitchens is buried and the drainage from sinks is piped to covered cesspools. The gangs are fed under contract and the kind and amount of food used are watched closely.

This interest of the Western Pacific in the comfort and health of its forces is also observed in the attention given to the improvement of quarters for maintenance forces. Included in the improvement program of this road are 66 residences for section foremen and agents, and bunk houses for laborers which are completed or under construction, also 116 tool houses, coal houses, toilets, etc., of which 39 are under construction this year. The section house contains four rooms and a bath and is piped with running water, wherever possible, while two four-room houses are built for the laborers. Each bunk house has two kitchens and two sleeping rooms. They are attractively painted inside and out and equipped not only with heating and cook stoves, but with running water, where available, and with shower baths.

The important work is being done under the direction of the regular engineering and operating officers of the company. It is still too early to evaluate the full benefits derived from this improvement work but it is indicative that allowable train speeds have been increased 30 per cent in some districts while derailments attributable to track conditions have dwindled to a negligible factor.

Mechanical Division Represents a Great Industry

*Growth since beginning of the organization—Recent
improvements in conditions—Program of
convention*

THE tenth annual meeting of the Mechanical Division, American Railway Association, will be held at the Alexandria Hotel, Los Angeles, Cal., June 25-28, 1929. While this meeting marks the close of the first decade of the existence of the Mechanical Division as such, it was sixty-two years ago this fall that the Master Car Builders' Association was formally organized, and the work of that association, which now forms so important a part of the work of the Mechanical Division, had actually been carried on informally for three years before that time. A year later saw the organization of the American Railway Master Mechanics' Association.

This year's convention of the Mechanical Division, therefore, marks the completion of over sixty years of work of the organized car and motive power department officers of American railroads of refining and advancing the art of railway transportation, so far as it depends upon motive power and rolling stock.

Today in Perspective

A glance back to the beginning of the parent organizations recalls much that shows the tremendous advances that have been made during these two generations of organized effort, and also much which shows that at least some of the problems of sixty years ago are still among the problems of today—presented on a larger scale and in somewhat different terms, no doubt, but essentially the same, nevertheless. In 1867 there were 39,000 miles of steam railroad lines in the United States and these railroads operated a total of some twelve or thirteen thousand locomotives. Few of these locomotives exceeded 40 tons in weight and few of the boilers were more than 48 in. in diameter, carrying steam pressures seldom exceeding 100 to 120 lb. per sq. in. Freight cars seldom exceeded 10 tons carrying capacity and were carried on trucks the frames of which were largely of wood construction.

One of the most pressing problems to which the American Railway Master Mechanics' Association devoted itself immediately on its organization was the determination of the causes and means for the prevention of locomotive boiler explosions which were of exceedingly frequent occurrence at that time, notwithstanding the small size of and low working pressures carried by the boilers then in service.

Increased Boiler Reliability

A comparison of these few facts with those concerning the size, number and reliability of modern locomotives, are sufficient to indicate not only the tremendous growth in the size of the industry and the size and capacity of equipment, but to suggest the marvelous increase in reliability which has since been attained.

On the other hand, at a meeting of car masters held at Adrian, Mich., September 19, 1866 (a year prior to the formal organization of the Master Car Builders'

Association), at which eleven railroads were represented, the following resolution was adopted:

"RESOLVED, That we recommend to the Red and White Lines, that they, through the presidents and superintendents of the different roads, authorize N. H. Marsh, of the Cleveland, Painesville and Ashtabula Railroad, and Joseph Jones, of the New York Central Railroad, to each build a sample car of such style as in their judgment they may think best, and after such cars are built and approved by the Presidents and Superintendents of our connecting lines, we recommend that such cars be our pattern cars, and that all roads running in connection conform in all the details to the pattern cars, thereby saving all our companies much expense and delay in running repairs. We would also recommend that in the building of the different styles that the axles and brasses and other parts that it is possible to make so, be precisely uniform, also that Mr. Marsh and Mr. Jones each furnish to each road patterns for the use of each road at the expense of the road that receives them. We also would recommend that, in view of the constant increase of the cars in the various lines in connection with us, that the Presidents and Superintendents have this matter acted upon immediately in order to meet the wants of roads now building cars."

Here is the question of standardization, some phases of which are stated in terms not so markedly different from those in which it has been discussed and, no doubt, is still being discussed by the members of the various sub-committees of the Car Construction Committee responsible for the development of the various standard designs now under consideration.

The following resolution, which was also adopted at the same meeting, marks an important first step toward the present highly developed and systematized handling of the maintenance of cars in interchange under the present A.R.A. Rules:

"RESOLVED, That in case of any damage or repairs of any kind whatever, it shall be the duty of each car master to instruct his inspector to place on such cars a card stating where such damage or repair was done, signed by the car master of each road on which it was done, thereby enabling all interested to readily ascertain where the damage or repairs was done."

From the relatively small activity involved at the beginning of the organized efforts of the motive power and car department officers, the growth of America and its railroads has been such that today the problems of maintaining some two and three-quarters million cars of railroad ownership and 288,000 cars of private ownership freely exchanged between the lines of practically all of the railroads on the North American continent, involving the fixing of responsibility for expenditures approaching one hundred million dollars annually, are all handled in an orderly and satisfactory manner under



J. A. Power



C. J. Bodemer



W. L. Bean



J. Purcell



F. H. Hardin



O. S. Jackson



C. E. Chambers



E. B. Hall



J. E. O'Brien



S. Zwight



A. G. Trumbull



O. A. Garber



R. L. Kleine

the Rules of Interchange which have been developed and modified by these organizations.

An Industry of Major Importance

The motive power and car department officers, who constitute the membership in the Mechanical Division, are responsible for the conduct of an industry which expends annually approximately one and one-quarter billion dollars in equipment maintenance, to which must be added one-quarter billion dollars of transportation

seven hundred million dollars annually for the capital accounts of the railroads. Taking the railroads together, the motive power and car departments form one of the greatest industries in America, employing about 400,000 men and supporting with their purchases an equal or even greater number of workers employed in other manufacturing industries.

But the motive power and car departments of the railroads are not to be judged alone by the magnitude of their operations. From the standpoint of their influ-



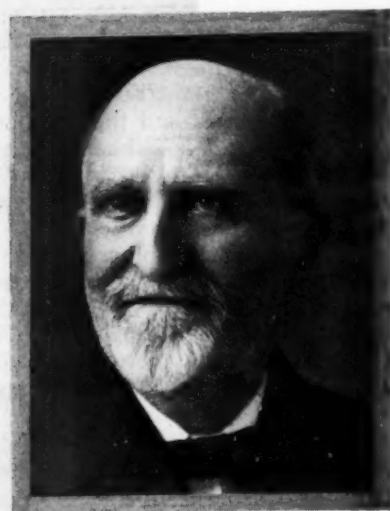
V. R. Hawthorne
Secretary



G. E. Smart
Chairman



A. R. Ayers
Vice-Chairman



J. S. Lentz
Treasurer

expenses for which they are directly responsible and between one-third and one-half billion dollars spent for locomotive fuel, for the economical use of which they share a major part of the responsibility with operating officers. Of these expenditures, from three hundred million to four hundred million dollars is for materials required for the maintenance and repair of cars and locomotives and for supplies, for the selection of which the members of the Mechanical Division are entirely or partially responsible. To this amount must be added expenditures for equipment and shop facilities ranging from one hundred seventy-five million to as high as

ence on the transportation of the nation, they may be more effectively judged by the nature of the progress which they have been making in recent years.

Progress in Equipment Maintenance

After the shopmen's strike of 1922 the railroads entered upon a comprehensive program of motive power and rolling stock rehabilitation which increased the total maintenance of equipment expenditures from one and one-quarter billion in 1922 to a little less than one and one-half billion dollars in 1923. The condition of the equipment was such during 1922 that the average per-

centages of the equipment unserviceable was 25.5 for freight locomotives, 23.5 for passenger locomotives and 12.8 for freight cars. Conditions have steadily improved since that time so that during 1928 they were such that averages of only 16.3 per cent of the freight locomotives, 16.4 per cent of the passenger locomotives and 6.2 per cent of the freight cars on the lines were unserviceable.

The improvement in conditions is also partially reflected by the improvement in fuel economy. In freight service fuel consumption per one thousand gross ton-miles, including locomotive and tender, has decreased from 163 lb. in 1922 to 127 lb. in 1928, and in passenger service from 17.9 lb. per passenger-train car-mile to 15 lb. in 1928. These improvements have been accompanied by a gradual decline in the total cost of equipment maintenance which, for 1928, was less than one billion two hundred million dollars.

Extent of Economies

The extent of economies in equipment maintenance which have taken place during recent years is even more strikingly indicated by the number of employees in the maintenance of equipment department than it is by the decline in the gross expenditures. In 1922 there was an average of 105,000 car men in the employ of the Class I railroads, and the number increased to 137,000 in 1923. For 1928 it had dropped below 100,000, even less than during the strike year when the number of men was severely curtailed for several months. Much the same changes have occurred in the number of the other craftsmen employed by the railroads. In 1921 there was a total of approximately 74,000 machinists, boilermakers and blacksmiths in the employ of the Class I railroads. This increased to over 100,000 in 1923 and has gradually reduced since that time until there were less than 80,500 men employed in these crafts during 1928.

These reductions in forces and expenditures indicate that the high standards of maintenance now prevailing, which furnish the operating departments with reliable equipment seldom subject to failures on the road, are not expensive to adhere to once they are established.

The work of the Mechanical Division has contributed to these improvements in many ways. Notable in this respect has been the work of the joint Committee on Locomotive Utilization and Fuel Economy which has done much to improve engine terminal operation, motive power utilization and motive power conditions. While other phases of the work of the division may not so easily be directly related to the tremendous improvements which have been effected during the past few years, the work of such committees as Car Construc-

tion, Wheels, Brakes and Brake Equipment, Draft Gears, and Inspection and Tests of Materials have contributed to the foundation on which these results have been built and on which further improvements in the future will rest.

The Program

The program of this year's meeting of the Mechanical Division contains the reports of eighteen technical committees, noteworthy among which is the Committee on Draft Gears whose voluminous report this year contains the results of the draft gear tests conducted by the American Railway Association at Purdue during the past two years. The program is as follows:

Tuesday, June 25, 1929

9:30 A. M. to 5:00 P. M.

Invocation.
Welcome: Mayor of Los Angeles.
Address: P. Shoup, president, Southern Pacific Company.
Address: R. H. Aishton, president, American Railway Association.
Address: By the Chairman of the Mechanical Division, G. E. Smart, chief of car equipment, Canadian National.
Action on minutes of annual meeting of 1928.
Appointment of committees on Subjects, Resolutions, Correspondence, etc.
Unfinished business.
New business.
Report of General Committee.
Discussion of reports on: Nominations, Design of Shops and Terminals, Couplers and Draft Gears, Specifications and Tests for Materials, Brakes and Brake Equipment, Wheels, and Lubrication of Cars and Locomotives.

Wednesday, June 26, 1929

9:30 A. M. to 5:00 P. M.

Address: M. J. Gormley, chairman, Car Service Division, A. R. A.
Address: Chas. Dillon, vice-president and managing editor, Transportation.
Discussion of reports on: Car Construction, Arbitration, Prices for Labor and Materials, Tank Cars, Loading Rules, Safety Appliances (including report from H. A. Johnson, Director of Research). Apprentice Training, Automotive Rolling Stock, and Electric Rolling Stock.

Thursday, June 27, 1929

This day is set aside for a trip to Catalina Island.

Friday, June 28, 1929

9:30 A. M. to 12:30 P. M.

Discussion of Reports on: Locomotive and Car Lighting, Locomotive Design and Construction, Joint Committee on Utilization of Locomotives and Fuel Conservation, and Joint Committee on Reclamation.
Election of six members of General Committee.
Adjournment.

* * * *



Blairstown, N. J., Passenger Station on the Lackawanna



Vast Purchases Shed Light on Railway Supply Work

*Purchasing and stores departments do over billion dollar
business yearly—Large chain store operations*

THE magnitude and ramifications of railway purchasing and stores work bring out the interesting fact that in supplying their needs for materials the railroads carry on one of the largest merchandising and industrial operations in the country. Next week in San Francisco, Cal., officers of the purchasing and stores departments of railways will hold the annual convention of the Purchases and Stores Division of the American Railway Association. The work of these departments and the variety and importance of the problems with which they deal are not generally appreciated even by railway officers.

One of Largest Merchandising Operations

In the course of a year, the railways, largely through their purchasing and stores departments, spend almost two billion dollars in the nation's markets for materials, supplies and equipment, with which to operate, maintain and improve their properties. They operate some of the largest chain stores in the country, on the shelves and platforms of which they carry over five hundred million dollars worth of supplies. They are among the largest shippers, both of revenue and non-revenue freight. They operate timber-treating plants, coal mines, saw mills, printing establishments, reclamation plants and even manufacturing enterprises. They accumulate and sell several millions of dollars worth of scrap iron and other worn out materials a year, and the elimination and utilization of waste products also

run into six and seven figures. Large trains and fleets of automobiles and other trucking equipment feature their activities and over one hundred thousand men and women are engaged in the work, while buildings, roads and material handling equipment are used representing an aggregate investment well over fifty millions of dollars.

Convention Program Diversified

The varied activities with which railway purchasing and stores officers are concerned will appear from the subjects outlined for presentation and discussion at the coming convention of the Purchases and Stores Division. These subjects are listed in the program as follows:

- Address by Paul Shoup, president, Southern Pacific
- Address by R. H. Aishton, president, American Railway Association
- Address by the chairman, C. C. Kyle, purchasing agent, Northern Pacific
- Report of the General Committee
- Report on Stores Department Book of Rules
- Report on Classification of Material
- Report on Comparisons of Material Stock Reports and Store Expenses
- Paper on Discounts, by F. S. Austin, purchasing agent, Boston & Albany
- Report on Forest Products
- Report on Recovery, Repairs and Reclamation of Discarded Material—Classification, Handling and Sale of Scrap
- Motion Pictures—St. Louis-San Francisco Reclamation
- Report on Stores Department Buildings and Facilities for Handling Material



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F. S. Austin



J. L. Bennett



G. W. Bichlmeir



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D. C. Curtis



C. B. Hall



J. E. Mahaney



A. S. McKelligon



G. E. Scott



A. L. Sorensen



H. C. Stevens



L. C. Thompson

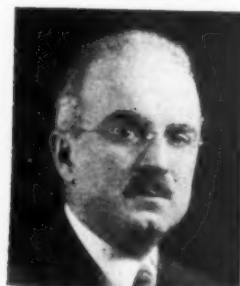


Russell

C. B. Tobey



M. E. Towner



Phillips Studio

C. E. Walsh

Report on Control of Shop Manufacturing Orders for Stock Material
 Report on Control of Material and Supplies Requirements
 Papers by S. A. Hayden, Missouri-Kansas-Texas, and A. G. Bohorfoush, Southern
 Report on Selection and Training of Employees in Purchasing and Stores Departments
 Report on Stationery and Printing
 Report on Purchasing Agent's Office Records and Office Organization
 Report on Terminal Railway Storekeeping
 Report on Delivery of Material to Users
 Reports on: (A) Standardization and Simplification of Stores Stocks
 (B) Disposition of Surplus or Inactive Materials
 Paper on Bin Tags, by L. C. Thomson, Canadian National
 Report on Unit Pricing of Materials and Unit Piling
 Report on Purchasing, Storage and Distribution of Equipment and Supplies Used in Dining Cars, Hotels and Commissaries
 Report on Fire Prevention
 Report on Stores Department Safety Practices
 Report on Control of Line Stocks
 Report on Workable Rules in Connection with the Carrying Out of the Clayton Anti-Trust Act
 Report on Locomotive Fuel
 Report on Joint Committee on Metric System

\$1,271,000,000 for Supplies in 1928

The Bureau of Railway Economics has recently ascertained the purchases made by Class I railways in 1928. They show how largely the railways contribute to the country's business, and they also show the imposing size of the railway supply work in some detail. The volume of these purchases, and comparisons with the purchases of previous years, are given in Tables I, II and III. During 1928, Class I railroads of the United States alone bought 122,380,000 net tons of bituminous coal, costing \$301,935,000. They bought 3,654,000 tons of anthracite coal, costing \$10,261,000. They bought 2,762,736,000 gal. of fuel oil, for which they spent \$5,361,000. During the same year they bought 88,774,000 crossties for which they paid \$95,684,000, also 1,353,808,000 ft. b.m. of lumber, for which they paid \$49,598,000. Last year these railroads bought directly 2,080,000 tons of steel rail, costing \$92,181,000. In addition to this, they purchased \$39,727,000 of wheels, tires and axles, \$67,376,000 of frogs, switches and rail fastenings and \$45,001,000 of structural steel. Their purchases for boiler tubes alone amounted to \$8,714,000. As much as \$22,969,000 was spent for signal, telegraph, telephone and interlocking materials. The purchases of bolts, nuts, rivets and



Purchasing is a Large Operation of Railway Supply Work—
The Purchasing Office of the Northern Pacific

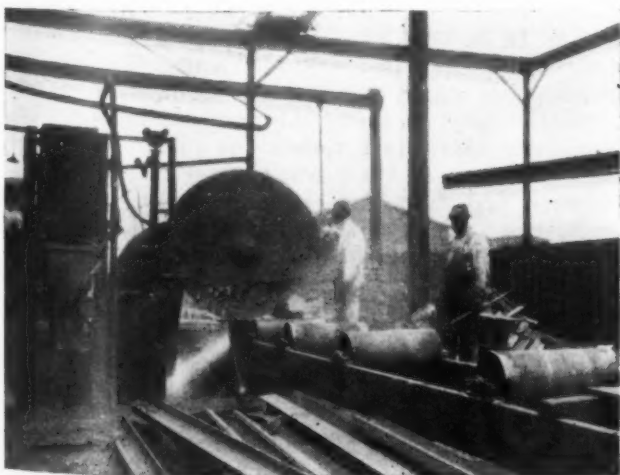
Table I.—Purchases by Class I Roads in 1928*

Item	1928	Per cent of Total
Fuel:		
Bituminous coal	\$301,935,000	24.84
Anthracite coal	10,261,000	.58
Fuel oil	67,051,000	5.62
All other	5,361,000	.39
Total fuel	\$384,608,000	.....
Forest Products:		
Cross ties (treated and untreated).....	95,684,000	7.75
Switch and bridge ties (treated and untreated)...	9,376,000	.87
Timber and lumber	49,598,000	3.45
Other forest products	6,136,000	.52
Total forest products	\$160,794,000	.....
Iron and Steel Products:		
Steel rail (new and second hand, except scrap)...	92,181,000	7.28
Wheels, axles and tires	39,727,000	3.40
Frogs, switches, crossings, track fastenings and bolts, spikes, tie plates, rail anchors, etc.....	67,376,000	5.16
Iron bridges, turn tables, structural steel, bar iron, and steel, forgings, fabricated and unfabricated shapes and pressed steel parts.....	45,001,000	3.67
Flues and tubes for locomotives and stationary boilers	8,714,000	.59
Telegraph and telephone, interlocking and signal material	22,969,000	1.81
Bolts, nuts, washers, rivets, springs, etc.....	18,446,000	1.37
Locomotive and car castings, beams, couplers, frames and car roofs	59,647,000	4.46
Machinery, boilers, repair parts and all other iron and steel products	43,483,000	3.25
Total iron and steel products.....	\$397,544,000	.....
Miscellaneous:		
Cement	6,300,000	.42
Lubricating oils and grease, illuminating oils, boiler compound, waste	23,968,000	1.67
Metal and metal products	49,826,000	3.99
Ballast	23,749,000	1.72
Air brake material and appliances for locomotives.	22,112,000	1.74
All electrical materials	18,400,000	1.63
Stationery and printing	25,638,000	1.92
Commissary supplies for dining cars and restaurants	26,055,000	1.96
Rubber and leather goods	9,521,000	.71
Painters' supplies and chemicals.....	33,794,000	2.54
Automotive equipment and supplies	2,031,000	.15
Train and station supplies and all other miscellaneous purchases	87,001,000	6.54
Total miscellaneous	\$328,395,000	.....
Grand Total	\$1,271,341,000	100.00

* All prices include freight and handling charges.

Table II.—Purchases by Class I Roads, 1924-1928

Item	1924	1925	1926	1927	1928
Fuel	\$471,656	\$459,465	\$473,354	\$438,821	\$384,608
Forest Products	180,872	170,305	186,291	175,729	160,794
Iron and Steel	365,610	419,255	507,302	432,604	397,544
Miscellaneous	324,917	343,018	392,085	348,774	328,395
Grand Total.....	\$1,343,055	\$1,392,043	\$1,559,032	\$1,395,928	\$1,271,341



Hundreds of Men are Employed in Reclamation—Sawing
Old Rail on the Texas and New Orleans



Distribution is Another Large Supply Operation—Store Trucks on the Great Northern at Superior, Wis.

similar supplies amounted to \$18,446,000, while they also spent \$59,647,000 for locomotive and car castings, and \$43,483,000 for machinery, repair parts and other iron and steel products, or a total of \$397,544,000 for iron and steel products alone.

Railway purchases for miscellaneous materials were equally imposing. In 1928, according to the Bureau's analysis, Class I railroads of the United States bought 3,060,000 bbl. of cement, costing \$6,300,000. They spent \$23,968,000 for lubricants and illuminating oil and boiler chemicals, and \$18,400,000 for electrical materials. Their expenditure for stationery and printing was \$25,638,000. The fruit, meat, vegetables and other supplies for dining cars and restaurants reached a total of \$26,055,000, while they also spent \$9,521,000 for rubber and leather goods, \$33,794,000 for painters' supplies and chemicals, \$2,031,000 for automotive equipment and supplies, and \$87,001,000 for various supplies for use on trains and in stations, etc. These purchases, which reached a total of \$1,271,341,000, do not include large expenditures for materials and supplies provided by builders of equipment and engineering projects, nor the miscellaneous supplies bought in this country by Canadian and other roads.

Spend \$200,000,000 for Equipment

In addition to fuel and rail and the vast quantities of 100,000 or more different kinds and sizes of miscellaneous materials bought directly, the railroads also buy locomotives, cars and other equipment. In Table IV, the Bureau of Railway Economics gives the capital expenditures authorized during 1928 for equipment and for roadway betterments and the actual expenditures made during the first three months of this year. During 1928, an expenditure of \$51,500,000 was made for the purchase of locomotives, and a total of \$172,800,000 for other equipment, including \$116,549,000 for the purchase of freight train cars, \$41,215,000 for passenger train cars and \$452,364,000 for road and structures.

Table III.—Quantities Purchased 1924-1928

Item and Unit	(000 omitted)				
	1924	1925	1926	1927	1928
Bituminous coal, net tons	126,372	129,325	140,084	130,190	122,380
Anthracite coal, net tons	4,673	3,780	3,678	3,199	3,654
Fuel oil, gal.	2,848,550	3,043,783	3,058,916	2,765,259	2,762,736
Cross ties	98,130	87,965	93,760	97,135	88,774
Switch and bridge ties, ft. b.m.	329,040	306,444	365,957	326,735	258,462
Timber and lumber, ft. b.m.	1,296,430	1,416,111	1,580,767	1,285,289	1,353,808
Steel rails, gross tons	1,779	2,179	2,504	2,278	2,080
Cement, bbl.	2,211	2,104	3,127	2,673	3,060
Ballast, cu. yd.	14,265	21,673	25,422	28,430	27,156

It is estimated that the railroads bought 25 per cent of all the bituminous coal produced in the United States in 1928 and over 15 per cent of the country's total output of forest products, and 19 per cent of the entire iron and steel output of the year which includes over 85 per cent of all the rails manufactured, 95 per cent of the track accessories, 25 per cent of the steel plates, 10 per cent of the steel shapes, 9 per cent of the iron bars, 7 per cent of sheet steel, 3½ per cent of tin plate and 3½ per cent of wire products. As much as 20 cents of every dollar of the operating expenses of railways goes for material and this does not consider supplies for additions and betterments.

These expenditures for materials and supplies are not made in one year and not in another, but are always large and are made throughout the year. Transportation is continuous in its operations. The 65,000 locomotives and more than 2,500,000 cars owned by the railroads must be kept in repair, and trains must be operated on schedule regardless of climatic or other conditions. Safety, moreover, is a necessity, and economy must be sought.

Over Nine Hundred Railway Stores

Upon the purchasing and stores departments of railroads, the responsibility largely rests to see that all the different kinds of material are supplied as, when and where required, and to do so without extravagance or waste. In the performance of this work, supply officers are properly compared with merchants. The materials and supplies which they buy are produced in all parts of the country. Usually they are not produced until manufacturers receive orders for them. The supply departments must know where these materials can be obtained, and secure their production expeditiously and at the best prices. A few cents per pound one way or the other mean little to the individual purchaser, but may represent thousands of dollars to the railroads, so large are the quantities involved in much of their buying. It is a simple matter for a user of materials to ask for materials, moreover, but the supply department must satisfy the needs of vast numbers of users who are widely scattered.

Since requirements can not be bought until they are properly described, efficient supply departments must promote the establishment and use of systems of identification, including standards and specifications. Ordering must be systematized to avoid confusion. Trans-

portation conditions, manufacturing conditions and price trends must be watched, and bookkeeping must be done that will clearly show all steps in the purchase procedure, from the time orders are received until the time shipments, prices and freight charges are checked, discounts secured and bills rendered. Typical railroads purchase from over 5,000 individuals, firms or corporations during the year, while it is not exceptional to handle over 100,000 orders and a larger number of invoices. From 10 to 50 or more stores are operated by individual railroads. As much as \$3,000,000 worth of stock is carried at some of these stores, while over 900 stores are required throughout the country in connection with railway supply work.

Complicating Problems

Railway supply work is complicated by two problems not fully appreciated by the departments served. One is the necessity of anticipating requirements for materials well ahead. The need for commodities may, and frequently does, develop quickly, but supplies can not, like the air, be had merely for the taking. It requires time to order material; it takes time to purchase, make the material and inspect and ship it; and such commodities as ties and lumber may also require several months' seasoning and also preservative treatment before they can be used. Materials, which are not available when required, delay work even where emergency tactics are employed, and this causes added expense and frequently results in the purchase of inferior material.

Turnover Important

Another problem is to avoid excessive accumulation. Supply organizations in their efforts to satisfy all users of stock are not free to carry any quantity stock. Unlike the merchant, supplies are not bought by railroads for the purpose of resale at a profit, but are obtained for specific needs and once having been acquired, must be carried until used. Unapplied materials are a liability not only by representing frozen capital, but also because they take up space, require handling and suffer weathering, rusting or other depreciation, including obsolescence. Supply forces of railways must be watched constantly to control their stocks by securing the highest turnover possible.

To do these things efficiently, however conditions of operation and the requirements for material may fluctuate, calls for elaborate records of consumption. It requires space and facilities in which to receive and store material and from which to ship it elsewhere. It requires a periodic inspection and the counting of every item wherever located to measure replenishments and check turnover, and it calls for the training of men in all the various rules and methods required for orderly procedure.

The purchase price, moreover, is not the final cost of material supplied. Like the merchant, the supply officer is confronted with the cost of shipping, and after that,

with the expense of the handling of the material again and again before it is finally applied. As purchasers of supplies, the railroads are among the largest of shippers. It is not uncommon for a railroad to receive over 100 cars of material daily at single supply points and to ship 25 cars to other places. As purchasers of supplies, the railroads are among the largest of shippers. They annually pay freight charges for transportation on other lines, the volume of which is of the first magnitude. The freight on coal is over one-fourth of its cost to some roads, while \$100,000 is a small freight bill for the average road to pay in a year's time on its purchases. The supply departments do much of this shipping and they must keep the freight charges as low as possible. The same is true of the labor charges and other costs of handling materials after purchase. Some of these costs are hidden, but they must be taken into consideration. With stores expenses chargeable to material ranging from 2 per cent to 5 per cent, and more, and with approximately 75 per cent of this expense representing actual handling costs, the importance of striving for full cars, reduced haul and economical methods of handling becomes evident.

Distribution a Problem

In the interests of efficiency and economy in transportation, the supply departments of many railroads undertake not only to have material available for those who use them at the lowest cost for purchase and handling, but also to save them the trouble and expense of coming after it. In this respect, they go farther than the merchant. The corner grocery store may favor the cash and carry method, but the supply departments of railroads must look first to the profit of the railroads. It is a costly procedure for mechanics and other users of material to interrupt their work at intervals to find and obtain much of the material they need, and this cost may be enlarged if the material is so situated as best to further its economical handling and control, for under such conditions, supplies may be stocked considerable distances from the ultimate point of use. The need for this special service grows as shop and roadway work becomes more exacting and it has become the function of the supply forces to provide it. It is customary for supply departments to operate entire supply trains periodically to distribute material, and progressive supply officers have enlarged upon this service by much delivering directly to users in shops and repair yards.

In connection with the service of distribution, they are road builders and owners of automobiles, trucks and trucking equipment, and they are also students of the new system of transportation, by means of which supplies are not only distributed to railway depots or to points outside of railway property by roads, but by which all materials in the shops are moved on wheels from machine to machine, and other work, such as moving sweepings, etc., is systematically performed.

With these additions to buying, warehousing and



Material Handling Equipment Features Supply Operations
—Piling Timber on the Southern Pacific

stock controlling operations, supply work departments assume not only the appearance of merchandising houses, but of industries, with problems of management as well as administration. The correctness of this becomes evident when it is considered that in addition to the foregoing many supply departments have large inspection organizations, particularly in connection with lumber. Through the employment of specialists, they participate in the development of standards, which, while satisfying the users' demand for quality, will simplify purchasing work. On some roads, they are also the operators of large timber-treating plants and rail conditioning yards. Some supply departments operate extensive wood mills with scores of power tools for cutting, surfacing and otherwise preparing lumber for application, and in many instances, they have turned printers.

Millions of Revenue in Scrap Handling

It falls upon practically all supply departments, moreover, to collect and dispose of all scrap metals and other materials that are discarded. This material is accumulated at suitable places and sorted to recover the serviceable material. Reclamation plants ranging from small shops equipped with a handful of machines, to establishments covering several acres of ground, and employing 100 men or more, are operated to repair those materials which can be rendered serviceable again or by which useless materials can be converted into something else, and the remaining material is separated into proper sizes and shapes by magnets, shears, cutting torches, etc., so that it can be sold at the best available prices. With the special organization and equipment employed for such purposes, some of these departments go so far as to dismantle the abandoned locomotives and cars, and extensive manufacturing work is done, ranging from the making of buckets and signs out of scrap materials, to the rebuilding of frogs and switches, coupler yokes, locomotive springs and the making of concrete pipe. Almost 30 per cent of all scrap material used in steel mills is said to be produced by railroads. The average railroad derives well over \$1,000,000 in cash from its scrap sales, while many roads report savings of several hundred thousand dollars from reclamation.

In the performance of all this work—purchasing, storage, distribution, stock control, scrap handling, reclamation and manufacture—the supply department of a single railroad will manage buildings and grounds representing an investment of several millions of dollars, operate several thousand dollars' worth of material handling equipment, especially where traveling cranes are used, and employ five hundred or more men, while it is conservative to say that there are over 50,000 men in the supply activities of all the railroads using facilities and equipment costing well over \$50,000,000.

The Purchases and Stores Division of the American Railway Association functions as a co-ordinator in this

work. Railway supply departments have common interests, and, as commercial industries co-ordinate to solve their common problems, the supply forces of railroads through Division VI, A. R. A., are brought together to consider theirs. By discussions in committee meetings over the year, supply specialists exchange their opinions and experiences. Problems needing joint effort are studied, and programs looking to the common good are launched. A spirit of friendship and co-operation is created resulting in acquaintanceships between individuals, a familiarity with facilities and methods, the value of which is real, and the mass gatherings at convention time to hear reports and addresses on the latest conditions and problems give the stimulus essential to progress.

Inventories Reduced

Partly through the activities of the Division, supply practices throughout the country in recent years have been marked by substantial improvements in the facilities for handling materials, in the growth of the supply work and in the methods of administration and control. Standardization and simplification in industry have been notably advanced, and supply forces are conversant with the advanced methods and practices of industry.

Largely as a result of exchanging information and the attention given to better ways and means of stock control, the railroads have reduced the amount of stock carried in storehouses and other points from approximately \$755,000,000 in 1920 to approximately \$472,000,000 in 1928, or a reduction of over \$250,000,000 which represents a saving of from \$10,000,000 to \$12,000,000 annually to the railroads in interest charges alone.

An important feature of railway supply work in late years is the fact that the savings of the railroads through reduced inventories have been made without jeopardizing the service the supply forces are charged to provide the departments for which the supplies are bought and handled. The notion that good supply service requires large inventories is being disproved. Shop and roadway operations still echo delays because of insufficient material, but not on the scale that prevailed when stocks were more abundant. The improvement is the result of the closer supervision which better trained and organized supply forces are exercising. Scattered and slovenly conditions of stocks that marked earlier shop operations are disappearing under the new principles of merchandising, and users of material are more easily prevailed upon to abandon the conviction that each foreman must have his own stock of supplies to protect his work, and to realize that through orderly stock keeping at places where efficient material handling and distribution is provided, supplemented by better programming of roadway and shop work, the using departments can be served better and more economically than before. These conditions are constantly improving and further reductions in stock are constantly being made.



The Supply Work Also Includes the Handling of Huge Volumes of Scrap Materials—On the Burlington at Eola, Ill.

The increasing tendency of railroads to trade purchases for traffic, either on their own initiative or by reason of pressure from shippers, is the one tendency at present that seriously threatens the progress of efficient railway supply work and it remains to be seen how the railroads will solve the problem it presents. All arguments of the defenders of this practice to the contrary notwithstanding, it may lead to grave consequences if allowed to spread. There was a time when railways were known to have been built more largely to provide an outlet for the products of powerful financial interests than to be operated efficiently and economically. The subsequent vicissitudes of these projects afforded abundant proof of the economic fallacy of that plan. It is sufficient proof of the evils of rebating, moreover, that laws enacted to stop it were welcomed by roads that participated in such practices. "Reciprocity buying" has been pictured by its sponsors as something very dif-

Secretary W. J. Farrell, and also by the general committee, as follows: F. S. Austin, purchasing agent, Boston & Albany; J. L. Bennett, purchasing agent, Central of Georgia; G. W. Bichmeir, general purchasing agent, Union Pacific; D. C. Curtis, chief purchasing officer, Chicago, Milwaukee, St. Paul & Pacific; C. B. Hall, stores manager, Pennsylvania; J. E. Mahaney, superintendent of stores, Chesapeake & Ohio; A. S. McKelligon, general storekeeper, Southern Pacific; G. E. Scott, purchasing agent, Missouri-Kansas-Texas; A. L. Sorensen, manager of stores, Erie Railroad; H. C. Stevens, general storekeeper, Wabash; L. C. Thomson, manager of stores, Canadian National; C. B. Tobey, general storekeeper, Lehigh Valley; M. E. Towner, general purchasing agent, Western Maryland; and C. E. Walsh, purchasing agent, Pennsylvania. Preparations for the convention also included the co-operation of a transportation committee con-

Table IV—Gross Capital Expenditures Class I Roads 1923 to 1929

Item	1923 Thousands	1924 Thousands	1925 Thousands	1926 Thousands	1927 Thousands	1928 Thousands	1929		
							Authorized incl. carry- over from 1928	Expenditures first quarter 1929	Carry-over unexpended author- izations
Equipment:									
Locomotives	\$208,966	\$102,456	\$59,778	\$108,263	\$76,975	\$51,501	\$41,623	\$10,517	\$31,106
Freight train cars	409,665	318,571	222,476	185,792	136,490	116,549	102,195	14,168	88,027
Passenger train cars	40,105	53,134	41,207	58,117	53,769	41,215	32,634	10,835	21,799
Other equipment	22,988	19,448	14,653	19,750	21,466	15,036	9,672	2,122	7,550
Total equipment	\$681,724	\$493,609	\$338,114	\$371,922	\$288,700	\$224,301	\$186,124	\$37,642	\$148,482
Roadway and Structures:									
Additional track *	108,745	116,725	145,757	166,758	139,175	116,494	143,662	20,086	123,576
Heavier rail	27,866	32,037	32,952	42,184	43,742	47,192	33,604	8,502	25,102
Additional ballast	9,471	10,825	11,665	16,520	16,230	15,748	12,365	1,622	10,743
Shops and enginehouses **	51,214	39,834	31,345	46,882	35,236	24,324	36,290	5,479	30,811
All other improvements	180,129	181,714	188,358	240,820	248,469	248,606	292,915	53,788	239,127
Total roadway and structures	\$377,425	\$381,135	\$410,077	\$513,164	\$482,852	\$452,364	\$518,836	\$89,477	\$429,359
Grand Total	\$1,059,149	\$874,744	\$748,191	\$885,086	\$771,552	\$676,665	\$704,960	\$127,119	\$577,841

* Includes rail and tie fastenings and other track material.

** Includes machinery and tools.

ferent from these earlier practices, but the similarity of the effects produced by it will become apparent if "reciprocity buying" becomes as prevalent as rebating was.

The rule under which dealers in reciprocity ostensibly operate is that purchases must not be traded for traffic unless the requirements of price, quality and delivery are as completely met as though traffic were not considered. The difficulty is in observing that rule when traffic influences become pronounced, and even where to all intents and purposes, this rule is religiously applied, the value of standardizing work and of efficient purchasing procedure is largely offset by the expense and time required in adapting the supply work to traffic demands.

Sixty Roads Report Practices

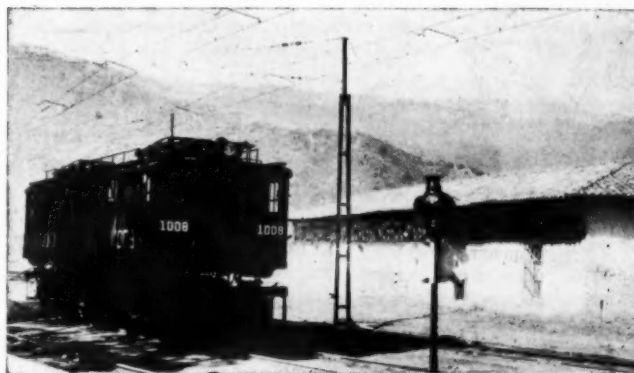
The interests of railway supply forces are furthered this year by the presentation of reports on problems such as standardization, scrap handling and material handling that have been before the association in previous years, and also by reports on three new subjects, making 19 reports. The committee members, who were selected under the direction of the chairman of committee, G. E. Scott, purchasing agent, M-K-T, represent an aggregation of 172 railway supply officers and subordinates from 56 roads. As many as 60 men on these committees are serving for the first time.

The work of these committees and all the work of preparing for the convention has been directed by the chairman, C. C. Kyle, purchasing agent of the Northern Pacific, assisted by Vice-Chairman, W. W. Davidson, general storekeeper of the Illinois Central, and

sisting of E. A. Clifford, general purchasing agent, Chicago & North Western, and J. G. Stuart, general storekeeper, Chicago, Burlington & Quincy, in arranging for special trains, while A. S. McKelligon, general storekeeper, Southern Pacific System, has supervised arrangements in the convention city.

San Francisco is remotely situated from the center of gravity of the railway business, but the location is advantageous to large numbers of railway supply officers from western railways who were not able to attend previous meetings of the association, while eastern delegates are afforded the opportunity to visit supply facilities and observe supply operations in the far West which are highly deserving of study.

* * *

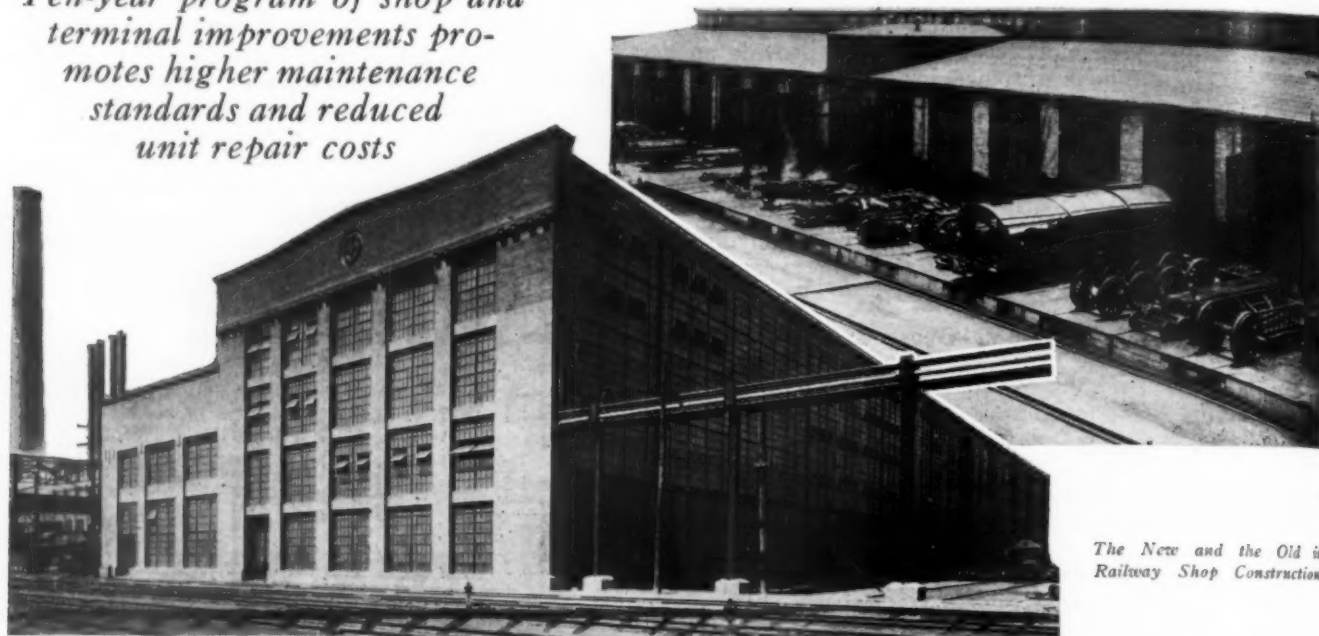


Mexican Railway.—An Electric Locomotive, Built by the General Electric Company

Mt. Orizaba (Elevation 18,400 ft.) Is in the Background.

Santa Fe Builds for Better Locomotive Maintenance

Ten-year program of shop and terminal improvements promotes higher maintenance standards and reduced unit repair costs

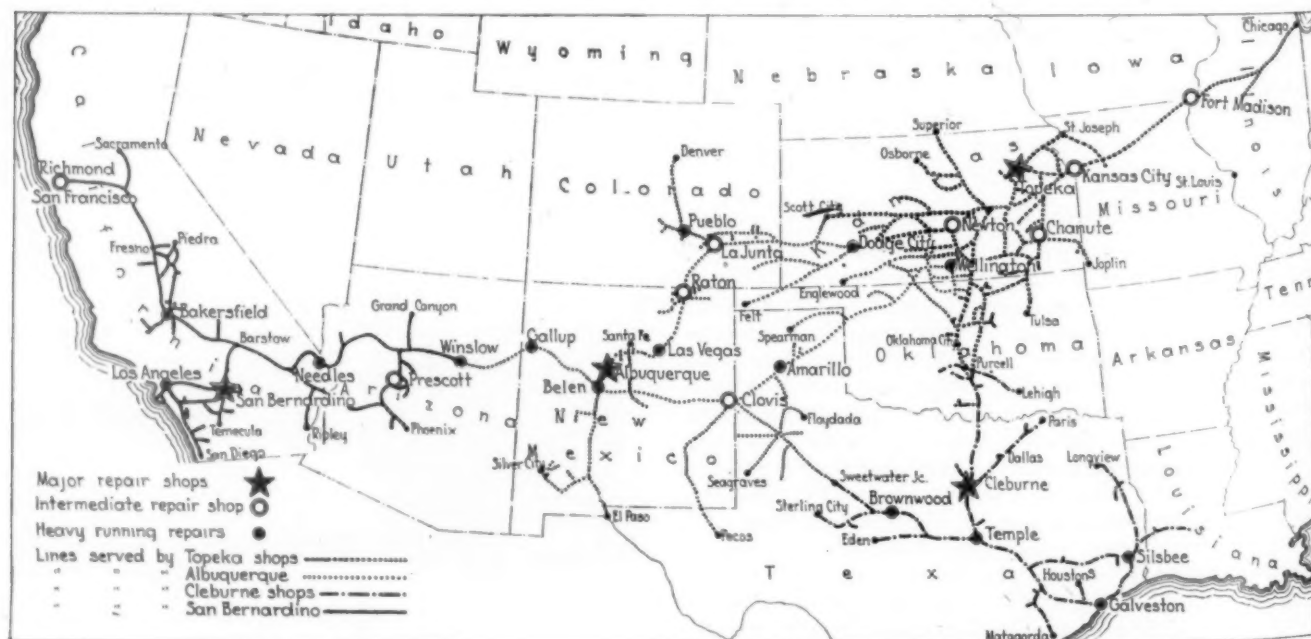


The New and the Old in Railway Shop Construction

AN extensive shop and engine terminal improvement program was begun by the Atchison, Topeka & Santa Fe in 1920, shortly after the return of the railroads to private control. New shops were built, old shops improved and all important shops more or less generally equipped with adequate cranes and the latest machinery and labor-saving devices. Engine-terminal lay-outs were revised, new buildings being constructed, stalls and turntables lengthened, boiler-washing and water-treating plants installed, as well as modern drop tables, hard floors for power trucks, coal and sand stations, ash pits, etc. Power plants, which furnish power for shops and terminals, were also gone over carefully

in the interests of economy, and furnished with up-to-date steam and power generating equipment, as well as the steam flow meters and other devices used for checking operation. It is estimated that during this period of a little less than 10 years, over 3,000 machine tools of different types, large and small, cranes, hoists, steam boilers, pumps, generators and air compressors were installed.

As a consequence of these improvements, the Santa Fe system facilities for dispatching and maintaining locomotives have been brought up to an unusually high level from the point of view both of potential capacity and of efficiency. The results are reflected in a gener-



Map Showing Location of Santa Fe Locomotive Repair Facilities—Territory Served by Each Major Shop Indicated



Ample Wheel Storage Space Served by Overhead Crane



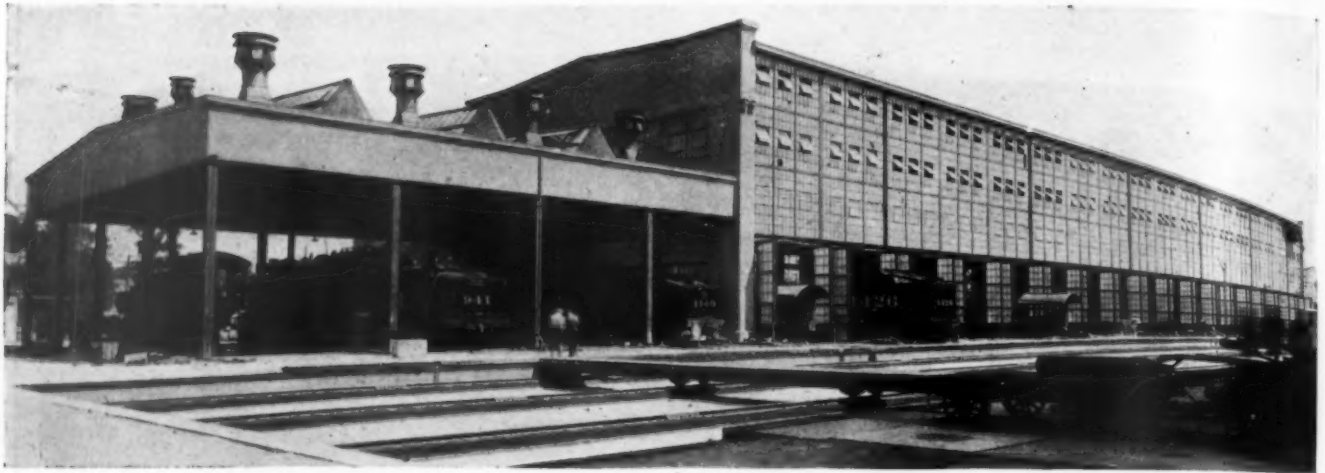
The Large, Well-Lighted Erecting Shop Has Ample Crane Capacity



Machine Shop at San Bernardino Equipped with a Full Complement of Modern Shop Tools



Unusually Large and Well Lighted Pipe and Tin Shop



Modern Boiler Shop and Firing-Up Shed at San Bernardino

Santa Fe than on other roads serving mountainous territory, but the level-road railroad man frequently has little real conception of just how much heavy grades and curves add to locomotive maintenance. Many Santa Fe locomotives carry two sand domes, and sand must sometimes be used freely on grades in both directions. The tire wear on locomotives used exclusively in the mountains is rapid, and locomotives must be taken to the shop, or enginehouse, at relatively frequent intervals for tire turning.

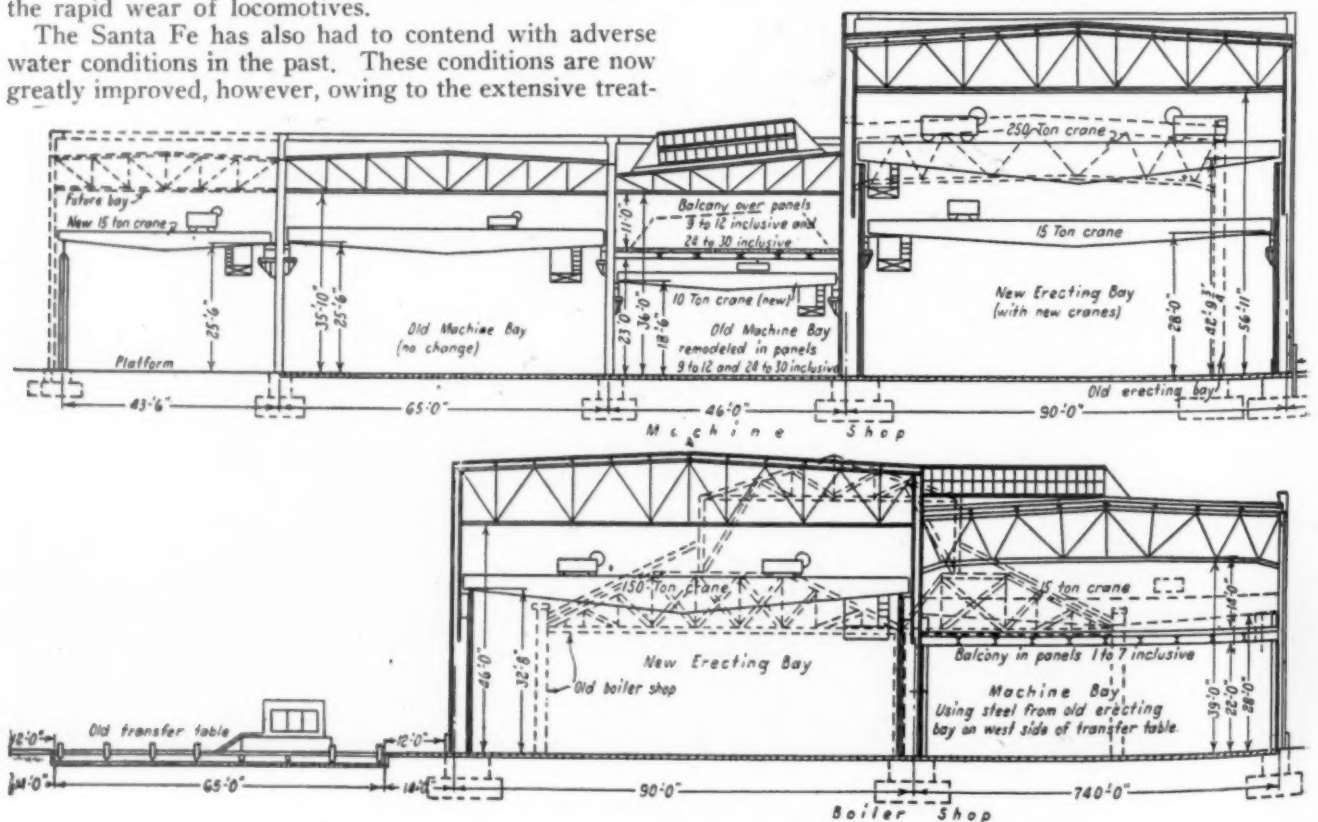
In common with other roads, the Santa Fe has seen the advent of increasing train loads, heavier power and higher speeds, all of which have an influence in increasing locomotive maintenance work and consequently increasing the value of suitable maintenance facilities. In some competitive service on the Santa Fe, notably that between Denver and Kansas City, the schedules for both passenger and freight trains are tight and require operating heavy power at high speeds, also contributing to the rapid wear of locomotives.

The Santa Fe has also had to contend with adverse water conditions in the past. These conditions are now greatly improved, however, owing to the extensive treat-

ment of a large proportion of all boiler feedwaters. The Santa Fe System treats annually over six billion gallons of water in wayside tanks, removing over 23 million pounds of incrusting solids, at a total cost of \$260,000, or an average cost per 1,000 gal. of \$.0421.

Heavy Repairs Concentrated at Four Shops

The motive power owned by the Atchison, Topeka & Santa Fe includes 1,907 locomotives, which, with 85 locomotives belonging to the subsidiary line, the Gulf, Colorado & Santa Fe, brings the total up to approximately 2,000 locomotives. The general shopping policy is to concentrate all possible general repair operations at four system points, namely, Topeka, Kan., Albuquerque, N. M., San Bernardino, Cal., and Cleburne, Tex. The territory served by each of these four shops is indicated on the map. Topeka shops serve the territory extending from Chicago to Dodge City, Kan.; to Wellington, Kan.; to Burcell, Okla. Albuquerque shops



Cross-Section Through Locomotive Shop Facilities at San Bernardino, Cal.

serve the territory from Dodge City to Winslow, Ariz.; Wellington to Albuquerque, N. M.; and Sweetwater, Texas, to Albuquerque. San Bernardino shops serve all lines west of Winslow. Cleburne shops serve all lines south of Purcell, and Sweetwater.

The map also shows nine intermediate repair shops at Fort Madison, Ia., Argentine (Kansas City), Mo., Chanute, Kan., Newton, Kan., La Junta, Colo., Raton, N. M., Clovis, N. M., Prescott, Ariz., and Richmond, Cal. These intermediate repair shops are now practically limited to heavy running repair work, however, because of the economies attendant upon concentrating heavy repairs at the four modern system shops. Besides the intermediate repair shops, 19 engine terminals, also indicated on the map and in the table of maintenance facilities, are provided with machine shops and equipment for handling heavy running repairs. On account of the possible economies, this work is now concentrated at the intermediate repair shops.

At all repair shops, the attempt is made to secure as uniform operations as possible throughout the year, this end being facilitated by the fact that the peak requirements for passenger and freight locomotives come at different periods of the year. The peak demand for passenger power occurs between May and October. Except for the movement of July wheat, the peak demand for freight power occurs earlier in the spring and later in the fall. This permits balancing the shop operation with passenger locomotives when most of the freight power is required for road service, and vice versa.

The first main shop on the Santa Fe to be improved was that at Albuquerque, which work was carried on in the years 1921 to 1923. The San Bernardino improvements followed from 1924 to 1927 and the Cleburne shop plant was begun in 1927 and probably will be completed in 1930. New enginehouse facilities or extensions to old facilities, including concrete buildings, amply high for adequate ventilation and lighting and furnished with complete modern equipment, have been provided at the following points: Shopton, Ia., Argentine (Kansas City) Kan., Emporia, Kan., Newton, Kan., Wellington, Kan., La Junta, Colo., Albuquerque, N. M., Las Vegas, N. M., Gallup, N. M., and Phoenix, Ariz.

Topeka Key to Eastern Situation

Topeka is the key to the locomotive maintenance situation on the eastern lines, being in the district of the heaviest traffic and a manufacturing point for the entire system. Approximately 10 per cent of the output of the Topeka shops is manufacturing work which includes, for example, the making of springs and rods for the entire system. In addition, a large tube and flue repair shop is maintained at this point, tubes and flues being shipped in for safe-ending and repairs and shipped out for service at outlying points.

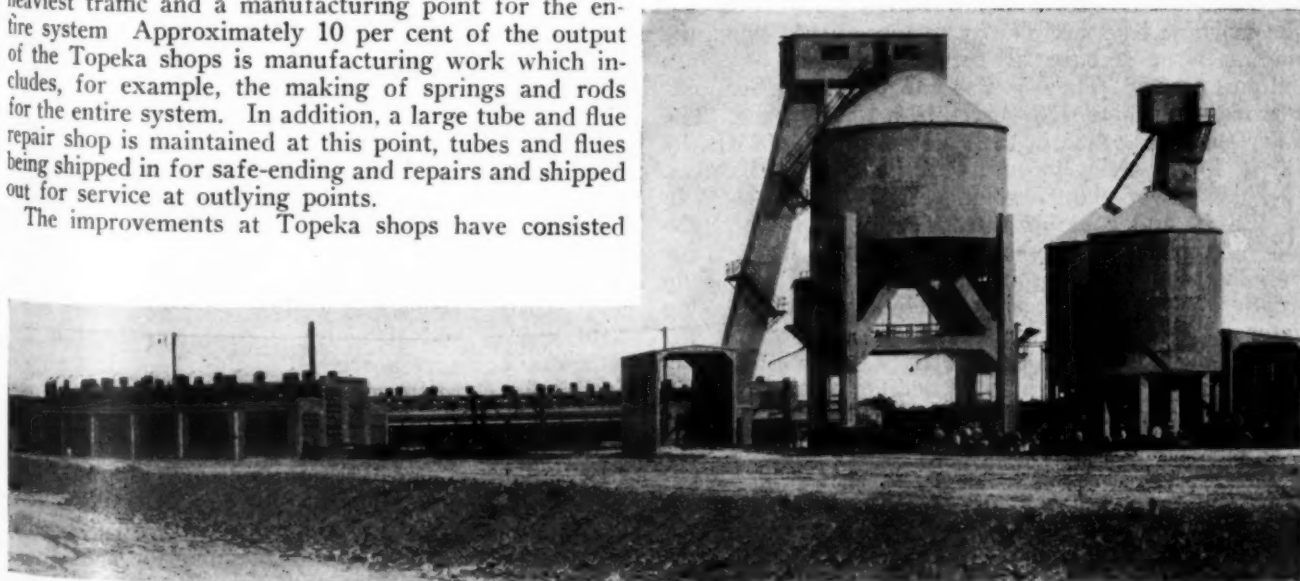
The improvements at Topeka shops have consisted

Table I—Santa Fe Locomotive Repair Facilities

MAJOR REPAIR SHOPS	
Topeka, Kans.	San Bernardino, Calif.
Albuquerque, N. M.	Cleburne, Tex.
INTERMEDIATE REPAIR SHOPS	
Fort Madison, Ia.	Raton, N. M.
Kansas City, Kans.	Clovis, N. M.
Chanute, Kans.	Prescott, Ariz.
Newton, Kans.	Richmond, Calif.
La Junta, Colo.	
POINTS EQUIPPED FOR HEAVY RUNNING REPAIRS	
Fort Madison, Ia.	Belen, N. M.
Kansas City, Kans.	Gallup, N. M.
Topeka, Kans.	Winslow, Ariz.
Newton, Kans.	Prescott, Ariz.
Dodge City, Kans.	Needles, Calif.
Chanute, Kans.	Bakersfield, Calif.
La Junta, Colo.	Richmond, Calif.
Pueblo, Colo.	San Bernardino, Calif.
Raton, N. M.	Los Angeles, Calif.
Las Vegas, N. M.	Cleburne, Tex.
Albuquerque, N. M.	Tempe, Tex.
Wellington, Kans.	Brownwood, Tex.
Amarillo, Tex.	Galveston, Tex.
Clovis, N. M.	Silsbee, Tex.

mostly in replacing old machine tools with modern equipment and providing extensions to the blacksmith shop, machine shop and boiler shop. The original shop buildings, erected in 1882 and improved in 1902, are still in use but crane facilities are available for giving classified repairs to a substantial number of locomotives monthly, in addition to the output of manufactured parts. This shop is the only major repair shop of the longitudinal type on the Santa Fe system. It is provided with 12 pits in the boiler shop and 28 pits in the erecting shop.

The shop improvements at Albuquerque, as described in the *Railway Age* of August 5, 1922, page 237, include a modern, reinforced concrete enginehouse of 35 stalls, with 100-ft. turntable; a blacksmith shop 80 ft. wide and 306 ft. long; a 140-ft. by 414-ft. boiler shop with 18 pits and a 239-ft. by 604-ft. machine shop with 26 erecting pits. The machine and boiler shops, both equipped with cranes of ample capacity, are of the transverse type, separated by a 60-ft. transfer table which provides maximum flexibility in shop operation. The erecting bay in the machine shop is 90 ft. wide and 57 ft. high from the floor to the underside of the trusses. Adjoining this section is a machine bay 65 ft. in width, and light machine and bench bays 40 ft. in width beyond. The most noteworthy feature of the new buildings is the large proportion of wall and roof areas of glass as well as the ample crane and machine-tool facilities.



Recently Constructed Santa Fe Enginehouse, Coal and Sand Plants at Emporia, Kans.

The original locomotive shops at San Bernardino were established in 1887, being located centrally with respect to the distribution of locomotives on coast lines. The new facilities in the locomotive department, described in the *Railway Age* of April 10, 1926, page 1001, include a 43-stall enginehouse, as well as new locomotive, machine and boiler shops, both of the transverse type and containing 30 pits and 29 pits, respectively. Both of these buildings face a transfer table 65 ft. in length which handles locomotives to and from any one of the 59 pits leading to the table and also conveys material from a number of service tracks leading to it. Another transfer table 120 ft. in length situated east of the boiler shop, accommodates the largest locomotive with its tender and the shop switching locomotive.

The most important unit at the San Bernardino plant is the machine shop, 673 ft. in length and 201 ft. in width, divided into thirty 22-ft. panels. The width is made up of three bays including a 90-ft erecting bay next to the transfer table, a 46-ft. light machine bay and a 65-ft. heavy machine bay. This shop is served by three over-head traveling cranes, one of 250-tons capacity and two of 15 tons capacity each, the light cranes operating on a runway underneath that provided for the heavy crane.

With a total of 59 pits, San Bernardino has the second largest erecting-shop capacity in the country, being next to the Altoona shops of the Pennsylvania. In machine equipment and the convenient arrangement of shop sub-departments, it is probably second to none. General repairs to all locomotives on the Santa Fe Coast Lines west of Winslow are made at San Bernardino, except to switchers which are used in the San Francisco terminals and maintained at Richmond shops.

Improvements at Cleburne

Cleburne is the principal shop on the Gulf, Colorado & Santa Fe and improvements at this point include a new building for the blacksmith shop and boiler shop, 130 ft. by 510 ft. The blacksmith shop, occupies one end for a distance of 160 ft., the remainder being given over to the boiler shop which contains 15 pits on the erecting floor, and 40-ft machine bay. The erecting floor is served by a 150-ton electric traveling crane. The machine shop is 202 ft. by 510 ft., and contains 23 pits in the erecting floor, five pits of which will be used for repairs to roadway equipment and the remainder for locomotive repairs. A 250-ton crane serves the erecting bay. The machine bays are similar to those at Albuquerque and San Bernardino that are served with traveling cranes and post cranes. There is also a material platform outside of the machine shop served by a 15-ton crane. The boiler shop has adjacent to it a shop building 45 ft. by 234 ft. for repairing locomotive flues and superheaters. The new power plant now under construction is 90 ft. by 125 ft. and contains three new 500-hp. watertube boilers, four air compressors, two of which are used for pumping constantly from deep wells on the shop grounds, also refrigerating machinery for drinking water systems, fire pumps, boiler washing pumps, etc. A new storehouse, also being started, will be 60 ft. by 442 ft., and two-stories high. Concrete platforms 60 ft. wide will extend 600 ft. on one end. The plans for the storehouse have not yet been completed. These shops occupy the site of the old machine shop and blacksmith shop, which were put up in the nineties. The main building, that is, the machine shop, was built of stone in 1896 to 1898.

The time for giving general repairs to all power is determined largely by necessary boiler work. When lo-

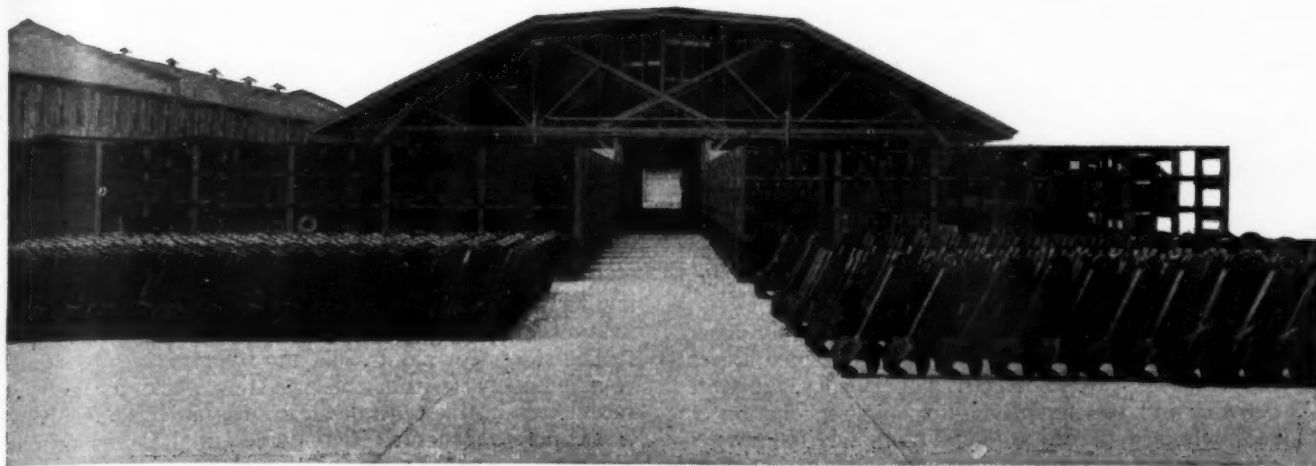
comotives are shopped on the Santa Fe, boilers are thoroughly inspected and repaired and flues welded in place; frames are examined for cracks and rebolted (cast steel bed frames present an important advantage in the latter respect); tires are turned; driving boxes repaired and motion work thoroughly overhauled.

Driving box and wheel work receive special atten-

Table II—Santa Fe Shops, and Terminals Equipped To Make Heavy Running Repairs

Location	Enginehouse facilities						Back shops			
	Year built or extended	Kind of cons.	No. of stalls	No. of drop pits	Turntable length, ft.	Locos. turned daily	Machine shop	Type of shop	Boiler shop pits	Erect. shop pits
EASTERN LINES										
Shopton, (Ft. Madison) Ia.	1909	Brick	40	10	85	49	Yes	Trans.	4	12
Argentine, (Kans. City) Kans.	1908	Brick	49	5	90	100	Yes	Long.	..	8
Topeka, Kans.....	1882	Stone	36	2	75	18	Yes	Long.	12	28
	1902									
Newton, Kans.....	1888	Stone	38	7	90	50	Yes	Long.	..	4
Chanute, Kans.....	1905									
	1908	Brick	30	3	85	18	Yes	Long.	..	4
WESTERN LINES										
Dodge City, Kans..	1906	Stone	28	5	85	34	Yes	.....	..	..
	1918									
La Junta, Colo....	1882	Brick	37	15	120	45	No	Trans.	..	17
	1929									
Pueblo, Colo.....	1880	Stone	24	1	75	34	Yes	.....	..	..
	1902									
Raton, N. M.....	1904	Stone	24	3	85	23	Yes	Trans.	..	8
	1906									
Los Vegas, N. M..	1917	Concrete	25	4	100	11	Yes	.....	..	..
Albuquerque, N. M.	1915	Concrete	35	7	100	29	Yes	Trans.	18	30
		Concrete								
Wellington, Kans..	1910	Stone	26	7	100	31	Yes	Long.	..	..
	1924									
Amarillo, Tex.....	1909	Brick	28	6	100	38	Yes	.....	..	..
	1927									
Clovis, N. M.....	1908	Concrete	36	8	120	24	Yes	Trans.	..	9
	1927									
Belen, N. M.....	1907	Concrete	17	2	120	28	Yes	.....	..	..
COAST LINES										
Gallup, N. M.....	1916	Brick	25	2	85	35	Yes	.....	..	..
Winslow, Ariz....	1926	Concrete	35	11	120	34	Yes	.....	..	..
Prescott, Ariz....	1915	Brick	7	4	85	10	Yes	Trans.	..	4
	1924									
Needles, Cal.....	1902	Frame	43	2	120	40	Yes	.....	..	..
	1920									
Bakersfield, Cal...	1907	Concrete	35	2	120	28	Yes	.....	..	..
Richmond, Cal....	1901	Brick	21	2	75	29	Yes	Trans.	..	8
	1906									
San Bernardino....	1908	Concrete	43	4	120	49	No	Trans.	29	34
Los Angeles, Cal...	1914	Concrete	35	8	85	32	Yes	.....	..	..
GULF, COLORADO & SANTA FE										
Cleburne, Tex.....	1898	Brick	36	4	85	31	Yes	Trans.	15	23
	1906									
Temple, Tex.....	1898	Brick	30	6	120	22	Yes	.....	..	..
	1914									
Brownwood, Tex...	1913	Brick	12	2	120	13	Yes	.....	..	..
Galveston, Tex....	1913	Brick	16	2	85	12	Yes	.....	..	..
	1905	Brick	20	4	85	13	Yes	Long.	..	2
Silsbee, Tex.....	1913									

tion on the Santa Fe, and, on account of the particularly severe operating conditions, it is necessary to turn tires a number of times between general shoppings. In fact, on the theory that properly maintained driving boxes and journals, shoes and wedges, etc., practically eliminate serious rod difficulty, locomotives used in the mountain territory are taken in the shop, tires turned, driving boxes removed, brasses, journals, wedges, rods, etc., checked periodically. This work is scheduled to be done usually at the time of the monthly federal inspection and washout. With clean boilers equipped with welded flues and a high standard of locomotive maintenance as regards driving rods, wheels and boxes, experience on the Santa Fe indicates that locomotives will produce desired results with practical freedom from failures and road delays.



The New Store at Sacramento for Car Material

Southern Pacific Uses Latest in Supply Work

*Spirit of service and progress in operations at Sacramento—
Build roads—Price material—Use telephones*

ON June 22 more than two hundred railway purchasing and stores officers enroute from different parts of the country to the annual convention of the purchasing and stores convention of the American Railway Association stopped at Sacramento, Cal., to visit the shops of the Southern Pacific and particularly to observe the facilities for and the operations of handling supplies for the railroad at that point. It was the largest single delegation that has visited these facilities, but it was not the first, for Sacramento has attracted visitors almost from the day, some 60 years ago, May 10, 1869, when rail, cars and locomotives, brought to California after months of sailing around the southern extremity of South America, were put into service on the Pacific link of the country's first transcontinental railroad, and the capital city of California became the supply depot for its operation and maintenance.

In the *Railway Age* of December 4, 1926, there was published a description of the revolutionary improvements made in stores operations on the Victoria Railways of Australia. These improvements were largely patterned after methods which the Australia railway men had crossed the Pacific ocean to see at Sacramento. Last year the general storekeeper of the Southern Pacific kept a record of the railway men who have visited Sacramento. They included persons from Japan, Australia, New Zealand, Africa, the Philippines and Hawaii, as well as those from remotely situated railways in this country. The Sacramento plant draws these visitors both because of the size of its operations and for the atmosphere of service and progress which railway men find there.

The general shops of the Pacific System of the South-

ern Pacific, embracing some 8,900 miles of lines extending from Portland, Ore., on the north, to Mexico on the south, and to Ogden, Utah, and El Paso, Tex., on the east, are located at this point. These shops are the largest in California and with the possible exception of one other, they are the largest west of the Mississippi river. They include facilities for the construction of locomotives and cars as well as for their general repair. Some of the largest locomotives in use were built in these shops and as many as 1,200 freight cars have been constructed in one season. The works include foundries for grey iron castings and freight car wheels, also foundries for steel castings and brass, and a rolling mill and spring shop.

Turnover \$1,800,000 in a Month

The Pacific Lines of the Southern Pacific require for their needs (actual consumption) from \$2,560,000 to \$3,094,000 worth of material and supplies per month, not counting rails, ties, fuel and dining car supplies, and because over half of these materials, chiefly metals, must come from Pittsburgh, Chicago and New England, they must keep stocked with about \$8,403,000 of these miscellaneous materials in the form of 50,000 different varieties and sizes to guard against the possibility of breakdowns in service, or an average of 89 to 108 days' supply. It is significant of the Sacramento operations that to meet the requirements of the mechanical department there and also to supply roadway forces and to replenish smaller supply points in that district, the Sacramento store alone carries in the neighborhood of \$2,600,000 worth of material, consisting of some 40,000 varieties and sizes, and does a business of around \$1,800,000 a month. This does not include its handling

of some 50,000 tons of scrap material a year, from which it derives \$250,000 in cash for the tonnage sold to smelters after over \$150,000 worth of materials have been recovered or reclaimed for service.

When new rail is being laid in the Southern Pacific tracks and the old rail is being brought in and sorted, 150 or more carloads of materials are sometimes received at Sacramento in a single day. It is common to unload 40 cars of miscellaneous supplies and 20 cars of scrap iron a day, and to load and ship out an equal number of cars, and this does not include the work of distributing quantities of materials to, or collecting them from, the shops and other consuming or producing points.

Almost 25 acres of land are used by the supply department at Sacramento and as many as 476 people are employed, consisting of 43 office, 17 supervisory, 226 stores, 75 delivery and 100 scrap handling and reclamation employees, who are divided among 8 stores, as follows:

- No. 1—A general store for all general supplies for shop maintenance and transportation
- No. 2—A car material yard and store for all materials required specifically for car repair and building work
- No. 3—A yard for sheet steel, ties and all other castings and parts for locomotive maintenance
- No. 4—A store for paints, oil and inflammables
- No. 5—A store for frogs, switches, track bolts and other track materials
- No. 6—An assembly store for all track tools and other supplies handled by supply trains and also for assembling other materials for special programs
- No. 7—A lumber yard for the seasoning and handling of all lumber for local car and building maintenance requirements
- No. 8—A store for bar iron and similar materials produced in a rolling mill
- No. 9—A scrap yard and reclamation plant, including facilities for straightening rail and for dismantling locomotives and cars

New Stores Centralized

The main store building is a structure of brick and corrugated iron which is 60 ft. wide, 500 ft. long and two stories high. It has a concrete floor, a concrete platform 100 ft. long at each end, and a concrete platform 10 ft. wide and 700 ft. long at each side, one platform facing the tracks and the other facing a concrete roadway. It is significant that this building was built only nine years ago, and is the first unit of a project looking toward the ultimate combining or grouping of all stores facilities in a central location where material can be more easily controlled and more economically handled than where it is scattered in places not affording adequate room for orderly arrangement or easily reached because of congested trackage or the impracticability of maintaining direct and continuously unobstructed outlets for distribution.

The car material facilities are less than a year old and form another unit in the centralization plan. They are built on the opposite side of the tracks from the main store to reduce switching and handling cars and to allow the combining of shipments for both stores in order to get increased car capacity. At the same time they lie in the direction of the car repair yards where the bulk of this material goes. These facilities include a concrete platform 70 ft. wide and 387 ft. long, built car-door high, with a building on one end, 60 ft. wide and 187 ft. long, and with tracks on one side and a concrete roadway on the other. The foremen's and stockmen's offices are enclosed and heated during the winter, but, otherwise, the building is constructed with open sides. Trailers can thus be loaded with much of the material at street level. There are 54 heavy wood racks of the open type built on the covered part of the platform where all material requiring protection from the weather is stored.

Couplers and other fast-moving material not requiring protection occupy the rest of the platform while other car materials and parts are neatly stored at ground level on rows of rectangular concrete platforms served by a concrete roadway for the operation of industrial trucks and within easy reach of a locomotive crane.

The storage yard for locomotive castings was also built recently as a further step in the centralization plan. This yard extends fully one thousand feet along the store trackage and, like the car material yard, it consists of series of rectangular concrete platforms or racks especially constructed for the materials in them and presenting an unusually orderly appearance by reason of the neatness with which the material is kept.

The stores for paints, oils and inflammables have been completed only within the past few weeks as the most recent step in this centralization program. The oil house is a concrete structure 60 ft. wide and 100 ft. long with a 10-ft. platform on each side and 50 ft. long in front, with tanks in the basement for 90,000 gal. of various oils, supplied by gravity flow from tank cars, and with 8 hand-operated oil measuring pumps upstairs and 3 electrically-operated automatic shut-off pumps for filling barrels, together with a platform scale and storage racks for oil supplies. The building for inflammables is a similarly constructed building, providing ample space to keep shipments of fusees and other inflammables separated. The paint building is 60 ft. wide and 100 ft. long.

Divide Work in Sections

In such an enterprise the form of management is important. The practice is not only to put a foreman in charge of each separate supply area, but to divide the stock in these areas in accordance with the specific classifications and put in charge of each, a section stockman equipped with an office and charged with the duties of keeping the stock in his particular section in a business-like order, replenishing it as used, and seeing that both customers and management are satisfied. There are 17 of these offices distributed among the material stock. All are artistically built and arranged, even to the maintenance of flower gardens around them in some instances. Here the stock books and other records are handled, all orders received and made, and every other field operation of a supervisory and clerical nature performed.

The descriptions of all items of material in these sections are standardized and recorded in stock books to avoid confusion in ordering and the material is arranged on platforms or shelves in accordance with these books so that its condition is open to view at all times. To secure orderliness and at the same time to expedite all determinations of quantities of material on hand, practically all shelf material is kept on trays with a certain number of items to a tray, while castings, lumber, etc., are stored in tiers, with stencils to show the accumulated count. Embossed metal tags are widely used outside so that when the material is painted periodically, the tag need only be wiped with a cloth to make the figures clear.

To keep the customers supplied with material and at the same time to avoid surplus, monthly statements of the value of stock on hand are prepared, affording comparisons over the year for one store with another and keeping the stock men alert to this responsibility. The figures required with all orders for material reveal the amounts on hand in comparison with the amount used while a master stock book maintained at the Sacramento store provides a complete record of all stock on hand at every point, which can be examined to see if the material ordered is needed or can be transferred from some other point.

The Southern Pacific has also adopted the practice of labeling bins to show the condition of the stock. If the label on the bin describing the material is white, the stock is active; if green, it is a slow-moving stock; and if yellow, it is obsolete and should not be replenished. In addition, every section has a blackboard showing the total amount of surplus in that section by value and the reduction made monthly, thus serving to keep all stockmen active in avoiding excess stock or disposing of it quickly when its accumulation is unavoidable.

Retail Store Methods

A supply practice at Sacramento, in the development and use of which the Southern Pacific is particularly distinctive, is that of pricing all material where it is stored. No road has gone into this practice as extensively and intensively. Every article, whatever its nature and

have repeatedly led to investigations culminating in the use of substitutes or decisions to make the items in the shop, or to abandon shop manufacture and purchase the materials in the open market as the case may be. It is also said that frequently the stockmen detect discrepancies in bills that would not otherwise have been found and also that the practice assures correct pricing for all material issued.

The cost of the freight agent's services are more than offset by the corrections or adjustments made in classifications underlying freight charges and it is also explained that the practice is particularly valuable in connection with inventories. The official inventory of stock is made by the use of bin cards. Four days before inventory, shipments and the receiving of material are discontinued. On inventory day the material is counted in each section and marked on the cards, with the unit price



Section Houses—Offices Like These Built Throughout the Supply Area are the Hubs of the Supply Wheels

location, has a price, and these prices are not kept in offices remote from the store-rooms or platforms, but are marked on the bin, or a tag is attached to the material or stenciled on the surface of the material, depending on its character and the place kept. It makes no difference whether the material is newly purchased, second-hand or manufactured in the company's shop, it is marked with the price. As soon as a bill is received from a manufacturer for material shipped, the unit price is determined, and to this is added the unit charge for freight as determined by a freight agent assigned to the general store. The total unit price is marked on the bill. In like manner the unit price is determined for all material repaired or made in shops. This unit price is not an average price for all material received in a month but is determined for each allotment of material. The section stockman receives the bill showing the unit price and posts it on the material unless the price is the same as before, and when any material is shipped or delivered to the shop, the stockman not only marks the order with the amount of material issued, but with the unit price shown for it.

The Southern Pacific agrees that it costs to maintain such a practice but the belief is strong that the expense is more than offset by the benefits. It is advanced that the practice promotes conservation of material through its effect in keeping the value of material before stockmen, users, and officers. The interest of users, it is explained, is constantly being aroused by the high cost of some articles and instances are cited where discussions

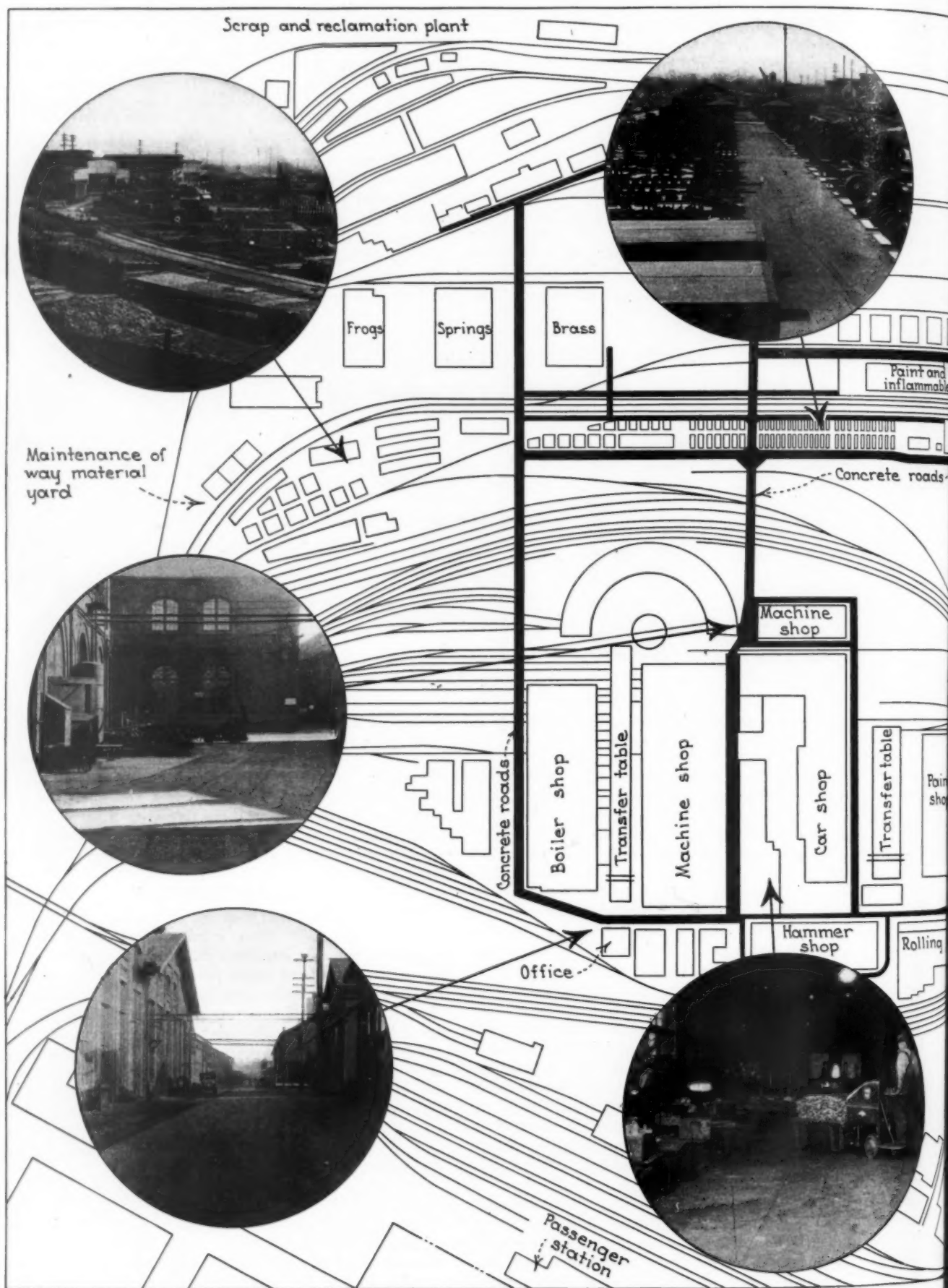
of each lot, and the cards are then sorted and surrendered to the auditing department. Under this plan the inventory work is done in a single day with no overtime, and a saving of \$4,000 results from the rapidity with which the work is done and the few adjustments required in pricing.

Build Good Roads

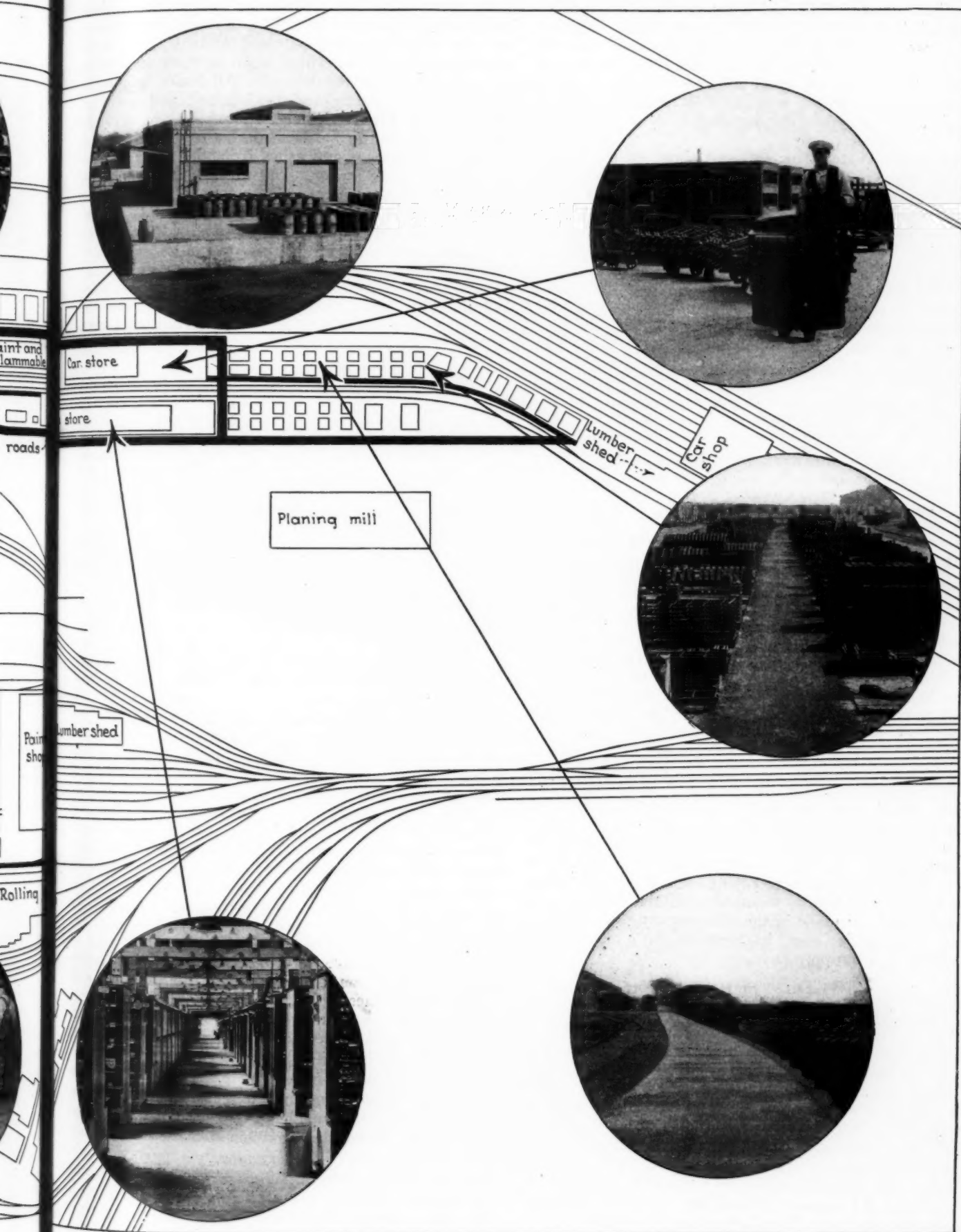
The first things that impress the visitor at Sacramento are the roadways. These roadways assume a larger interest when it is considered that they are typical of similar improvements at other points. In 1927, a three-year road building program was launched at Sacramento and already 8,000 ft. of concrete paving is in daily use, 5,000 ft. of it being 16 ft. wide and 3,000 ft., 10 ft. wide. Connecting these pavements are other runways so that a system of thoroughfares is maintained between different supply points and shops, the cleanliness, substantial character and continuity of which are contrasted with their predecessors. They have greatly reduced waste of time and effort in moving material, rain or shine, across a network of tracks.

Motive Equipment Cuts Handling

The Sacramento operation is also interesting by reason of the use to which these roads are put. The transportation of all material about the shops and stores is carried out under a delivery system supervised by the stores department. This organization carries material from the stores direct to the users and brings back any material to be returned to stock. It also transfers the



Ground Plan of the Sacramento Shops and Stores—Note Equipment for Handling Supplies and Orderly Arrangement of Material



A Feature of Present Operations is the Large Footage of Wide Concrete Roads, Which Are Shown on the Plan in Black

material between shops and from machine to machine while it is in process of repair or manufacture. Included in the work is the haulage of material from cars to material platforms or bins or vice versa, the delivery of lumber to and from the wood mill, the delivery of blacksmith coal to forges, the moving of sweepings and other refuse and, in addition, the transportation of material to and from outside points.

Previously, material was moved about on the shoulders of laborers and mechanics, or in wheelbarrows or hand trucks which laborers or mechanics would often spend time locating, or it was moved from one shop to another in push cars or by trap cars that required switching by yard engines. That such methods are rapidly passing as is the day when material must be repeatedly handled before use is apparent from the amount of equipment constantly moving on the new concrete roads that have been built. The equipment, at present, consists of the following:

- 1 5-ton low body automobile truck for highway service
- 1 3-ton low body automobile truck for highway service
- 2 1½-ton high body automobile trucks for highway service
- 3 ¾-ton light delivery trucks
- 3 gasoline industrial trucks
- 2 electric industrial trucks
- 4 electric self-propelling elevating trucks
- 1 3-ton rubber tired trailer for highway service
- 75 800 to 3,000-lb. capacity rubber tired trailers for use with automobiles
- 75 low trailers of various kinds for use with industrial trucks
- 500 portable platforms for use with the elevating trucks

With this handling equipment may be mentioned one 40-ton locomotive, and four 20-ton cranes, each with a 40-ft. boom.

For the present, the use of portable platforms is confined chiefly to the transfer of material to the shop, in the process of repair and manufacture. They are made of iron to withstand hot metals and the usual construction has been departed from by building them 17 in. high to obviate stooping on the part of mechanics. The platforms are in particular evidence throughout the foundry where practically nothing touches the ground.

In connection with the transfer of material from cars to store platforms, loading and unloading operations, which once required the switching of a car as many as three times and often as many days, are now done in a single day at one spotting as a result of the improvements in road and handling practices. It has been estimated that these recent innovations in haulage equipment and roads, together with the improvement which has been made in the arrangement and construction of store facilities, has resulted in a reduction of \$50,000 in the supply payrolls alone.

"Pay Dirt" in Reclamation

Scrap handling and reclamation form an important part of the Sacramento stores activities. A total of 56,815 tons of scrap was handled through this plant in 1928. The bulk of the scrap is gathered by the supply train while the remainder is produced locally. Much of the shop scrap, however, is sorted and loaded by store forces into buckets at the point where it develops and there disposed of by loading into cars by crane without bringing it to the scrap yard for a second handling. All scrap is sorted to recover serviceable material and the balance divided into A. R. A. classifications for use in the shop industries or for sale.

The miscellaneous iron and steel scrap is unloaded on sorting tables, rather than on the ground, as a means of expediting the work and conserving labor. The store department operates some machinery for reclaiming or repairing material picked out of the scrap

while other repair and reclamation operations are done in the shops on orders issued by the store department, and the activities are supervised so that no material which is serviceable or which might be made serviceable by reclamation will be wasted. All boiler lagging is reclaimed by grinding and remoulding, and even the ashes from journal packing reclamation are accumulated for sale and bring \$5 a ton because of the metal in them. Sweepings and ashes from the foundry floor are also sold for \$5 a ton. During 1928, the total sales from scrap at Sacramento netted the Southern Pacific \$260,256, while material conserved, repaired and reclaimed there represented a saving of \$166,000 over the expenditure necessary to buy this material in the market.

Operations in this area last year included the dismantling and junking of more than 60 abandoned locomotives and their preparation for sale, and also the scrapping of a large number of worn out steel cars. In this work oxyacetylene torches play an important role.

Telephones Versus Letters

Supply operations at Sacramento are not only interesting for the improvements made there and the variety of operations conducted, but for the effectiveness with which the entire department has been knit together by the use of an elaborate system of telephone communication. In connection with the delivering of material to the user, boxes are established at strategic points throughout the shops and yards for all orders and messages to the store and these are picked up at regular intervals through the day and delivered to the proper supply house for attention. Each month, also, the different supply points in the terminal and in different cities send in their orders, stating their requirements, and monthly records of each store's supplies are posted in the master stock book to show what material is available at each point.

Conditions are constantly arising in supplying the railroads where these systems or records prove inadequate, however, either to meet the problem or to supply needs promptly or to settle various clerical questions that arise. The Southern Pacific has attacked this problem with telephones. Telephones are installed throughout the shops and in every section stockman's office. These are connected through a private switchboard while other switchboards afford connections with other cities so that a shop foreman can communicate quickly with any section stockman and the storekeeper can instantly reach storekeepers or other officers at any other point on the 8,900 miles of line. The utility of this system is reflected in the small amount of correspondence between offices and in the dispatch with which emergencies are met.

This close functioning of the organization through the master stock books, sectional stockmen and the use of telephones is furthered by meetings of all store stockmen and foremen each week in a committee room where all weaknesses developing in methods are discussed, complaints considered and problems or changes in methods outlined and explained. There is no foreman or stockman in the Sacramento supply work who does not know those in charge of the work for which he supplies material, and all foremen and stockmen in the supply organization know each other. As a result of these methods both the stock carried and the number of men employed are constantly being reduced, without any reduction having occurred in the amount of material handled, and in spite of the fact that the number of activities of the supply forces continuously grows.

Analysis of

Grade Crossing Accidents

Leads to Better Understanding

*California Railroad
Commission's statistical
investigation discloses
many vital factors
deserving of serious
attention*



Wig-Wag at Crossing with Special "Two Trains" Indicator Mounted on Mast

By H. L. Engelhardt

Safety Engineer
California Railroad
Commission

GREATER utilization of the automobile as a means of travel, with the attendant increase of speed on improved highways, has presented a most serious problem in respect to giving the motorist advance warning of the approach of trains at a highway-railway grade crossing. There is an active campaign under way to raise the standard of grade crossing protection to meet the new requirements imposed by the motoring public. During the last few years, considerable attention has been given to the standardization of existing warning signals and the development of additional warning devices, such as automatic crossing gates. In an effort to help solve the ever-important problem of highway-railway grade crossing protection, the California Railroad Commission has made a statistical analysis of its grade crossing accident records for the last three years.

Three Millions for Crossing Protection

This study has brought out a number of vital factors, which, when properly understood, should lead to more effective efforts toward a solution.

At the present time the railroads of California have invested approximately \$3,000,000 in grade crossing protection and this investment is maintained at an annual cost of about \$800,000. Notwithstanding this substantial expenditure of money, accidents occur at many of the grade crossings which are protected with the most improved automatic devices now in general use. It is apparent, however, that considerable benefits are derived from these warning devices and their expense is fully justified. There are approximately 14,400 grade crossings in the state, and of these 8,381, or 58 per

cent, are protected by the standard cross-buck sign on each side of the railroad. (See graphical chart in Fig. 1.)

Those crossings protected with wig-wags number 1,660 or 11.5 per cent of the total and include most of the busiest, and, hence, the most hazardous crossings in the state. Flagmen are employed at 214 crossings and manually-controlled crossing gates at 112 crossings. Warning bells only are in use at 176 crossings.

Steady Increase in Casualties

The most obvious fact disclosed in any investigation of accidents at grade crossings is the steady increase, from year to year, in their number as well as in the persons killed and injured. In 1928, however, the statistics indicate an improved condition in so far as the casualties are concerned, there being 165 deaths last year as compared to 194 in 1927. Similarly there was a reduction in injuries from 763 in 1927 to 732 in 1928. Complete figures for the 16-yr. period, from 1913 to 1928, are given in Table A, wherein it will be noticed that the relative increase in automobile registrations has been considerably greater than the increase in casualties. In fact, although the casualties increased 95 per cent during the 16 years, the registrations jumped 1,390 per cent (see Fig. 2). The seriousness of the problem is immediately apparent when viewed from this angle.

A more illuminating index of the effectiveness of protection at grade crossings is given in the 8th and 9th columns of Table A, these columns giving the figures as to the number of casualties per unit of automobile registrations the unit in this case being 10,000 cars. It is noteworthy that this unit declined rather uniformly

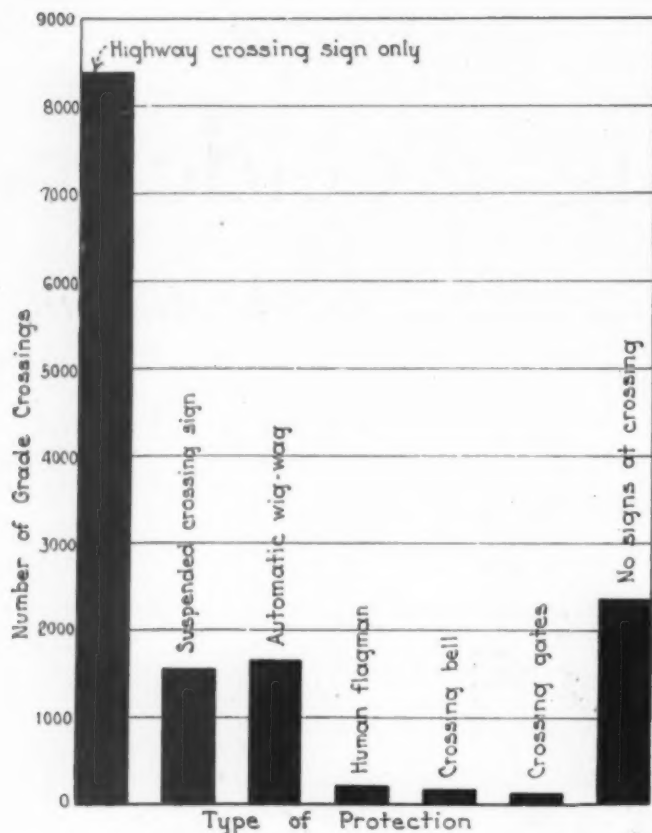


Fig. 1—Grade Crossings Classified as to Type of Protection

during the six years subsequent to 1913 until it reached the figure of 5.6 casualties per 10,000 automobiles registered. Since 1918 there has been no decrease in the casualty rate that might be considered as being at all striking.

Number of Foreign Cars Unknown

One factor which is difficult to evaluate is the number of foreign automobiles in the state. It is well known that these automobiles increase the accident hazards at grade crossings, owing to the fact that no state law compels the motorist to come to a full stop when the warning device is operating. If exact figures as to foreign cars were available, it is altogether likely that a reduction in the casualty rate would be found. The Division of Motor Vehicles estimates that at the peak, the foreign cars number 250,000. On the basis of

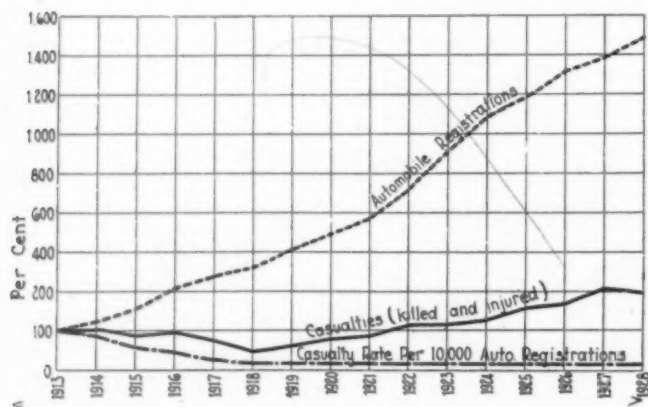


Fig. 2—Relationship Between Automobile Registrations and Casualties at Grade Crossings

1,822,262 automobiles registered in 1928, this would bring the casualty rate down from 4.9 to 4.3 per 10,000 cars.

More Careful Drivers Needed

The question naturally arises as to whether or not "rock bottom" has been reached. In other words, is it useless to hope for any further improvement in this direction? It would seem that a certain small proportion of automobile owners are too reckless to warrant any expectation of improvement in this casualty rate. None the less, the question is a highly debatable one and it is not unlikely that, through proper educational campaigns a still further reduction in this figure can be made.

It must be admitted that in order to operate a train or rail car, the engineman must be thoroughly familiar with the operating and safety rules of the railroad and he also must be physically fit to perform his duties. He is frequently required to pass examinations as to his knowledge of the rules and also as to his physical condition. On the other hand, a motorist is

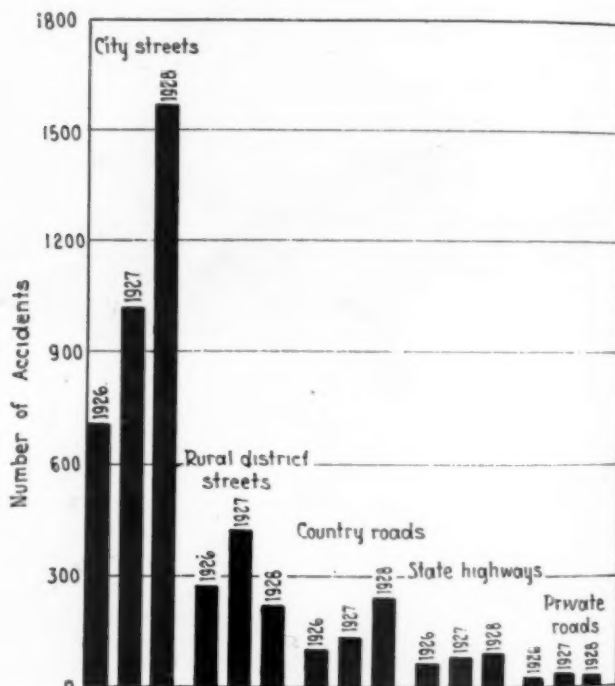


Fig. 3—Frequency of Accidents at Various Kinds of Crossings

not required to show such qualifications. Prior to 1925, a driver's license was issued to a motorist in this state without the necessity of his passing an examination. Once a motorist is awarded a driver's license, he is not required to pass any future examination to show that he is competent to drive a vehicle on the public highways, although it is only natural that in many cases disabilities occur to persons after a driver's license has been issued. Hence many of them are unfit to drive a car. It would seem to be a good plan to require motorists to renew their drivers' licenses at definite intervals of time. Such a regulation is now before the state legislature for consideration.

Records of Individual Crossings

A complete record of the accidents occurring at each individual grade crossing is maintained in the commission's file through the use of special record forms, which, in addition to showing the general characteris-

tics of the respective crossings, provide a space for the recording of all accidents occurring thereat. These records are filed in accordance with the assigned number for the respective crossing. The accident record of any individual crossing in the state is available for the three years beginning January 1, 1926, and by such record, the investigation of particular locations is governed.

The new system of numbering each grade crossing in the state affords a convenient method of recording

Table A—Relationship Between Number of Casualties at Grade Crossings and Vehicle Registrations

Year	Casualties				Vehicles Registered		Casualty Rate Per 10,000 Registrations	
	Killed	In-jured	Total	Per Cent	Num-ber	Per Cent	Num-ber	Per Cent
1913	83	377	460	100	122,444	100	37.6	100
1914	93	378	471	102.6	148,225	121	31.8	84.6
1915	73	338	411	89.5	190,196	155	21.6	57.5
1916	103	337	440	95.6	263,434	215	16.7	44.5
1917	117	231	348	75.5	337,333	276	10.3	27.4
1918	69	152	221	48.0	390,773	319	5.6	14.9
1919	78	199	277	60.3	503,522	410	5.5	14.6
1920	104	260	364	79.2	595,187	485	6.1	16.2
1921	96	297	393	85.5	698,343	570	5.6	14.9
1922	128	392	520	113.0	878,108	717	5.9	15.7
1923	134	392	526	114.7	1,114,977	910	4.7	12.5
1924	129	454	583	127.0	1,331,719	1,090	4.4	11.7
1925	169	560	729	158.4	1,451,543	1,190	5.0	13.3
1926	139	629	768	167.0	1,610,770	1,320	4.7	12.5
1927	194	763	957	208.0	1,702,639	1,390	5.6	14.9
1928	165	732	897	195.0	1,822,262	1,490	4.9	13.0

accident reports. At this time, numbers have been assigned to practically all the grade crossings involving the tracks of steam and electric railroads and public highways. The state highway commission has shown considerable interest and co-operation in the matter of classifying all the grade crossings involving state highways, in accordance with our numbering system. At this time, the highway commission is preparing a large map, upon which will be shown the grade crossing number for each state highway crossing. The various railroads have also shown considerable interest in the

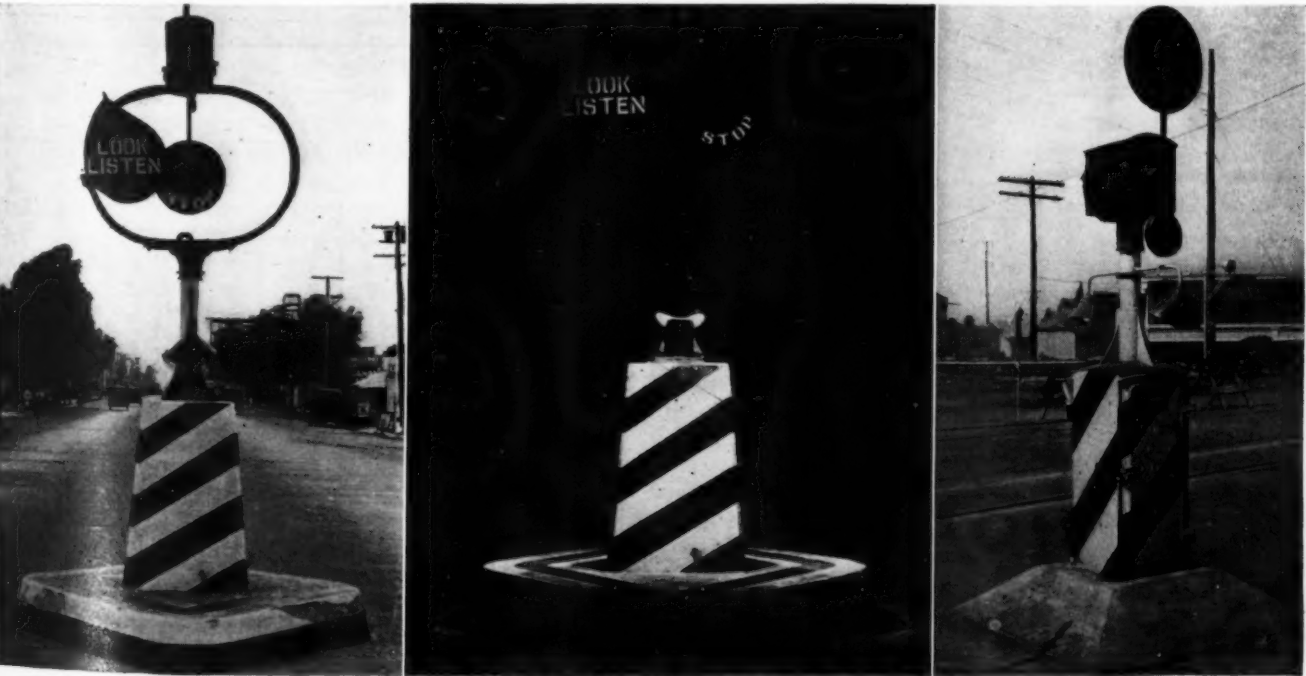


Experimental Automatic Gate Installation at Burbank, Cal.—The Arms Swing in Horizontal Plane

matter of identifying the various grade crossings by these numbers, as it affords a convenient method of keeping their records, as well as of making their reports to the commission.

General Method of Analysis

The commission's investigation has been carried out in accordance with a pre-determined plan of classification so as to obtain the greatest amount of relevant information possible. For instance, accidents have been classified as to the class of highway; namely, city street, county road, or state highway. Another classification has been made to distinguish between head-end collisions, rear-end collisions, collisions with the side of a moving train and with the side of a standing train. A further classification has been made as to the type of protection at crossings where accidents have occurred. The character of the protection at grade crossings in California is about as varied as in any state in the Union. The majority of the crossings have only a cross-buck sign and where automatic protection is provided, the swinging wig-wag is employed. The



Two Types of Center-of-Street Wig-Wag Installations—Note Floodlighting of Concrete Foundation at Night

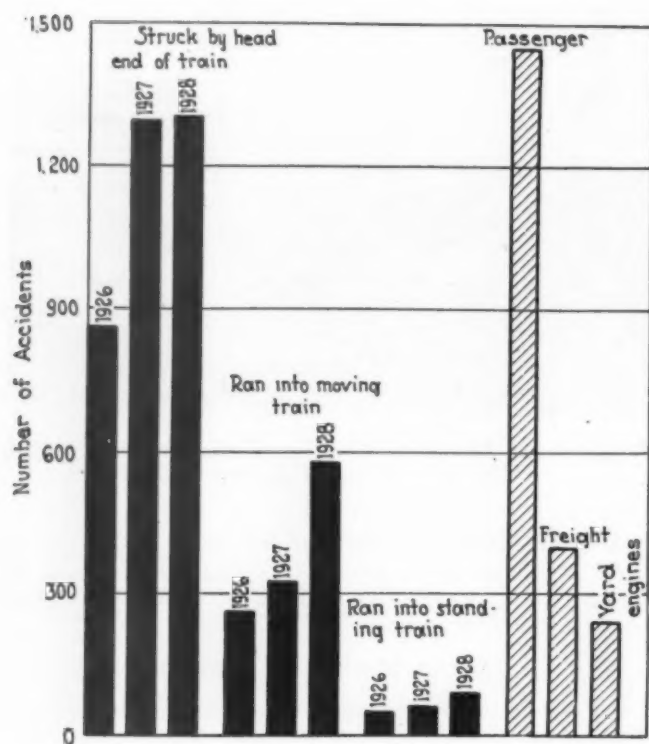


Fig. 4—Comparison Between Head-End and Side Collisions—Also Greater Accident Hazard of Passenger Trains

railroads are relieved of the necessity of providing the cross-buck sign at crossings when "the carrier maintains crossing gates, two wig-wags, or crossing gates with one or more wig-wags."

Table B—Accidents Classified as to the Visibility of Approaching Trains From the Roadway

Protection at the Crossing	View of Grade Crossing Obstructed		Unobstructed	
	No. Accidents	Casualties	No. Accidents	Casualties
Crossing sign	148	56	272	126
Wig-wag automatic	143	60	161	101
Suspended crossing sign...	102	21	58	8
Human flagman on duty less than 24 hr.....	25	6	42	13
Human flagman (24 hr.)..	31	2	35	19
Crossing gates (24 hr.)...	7	1	24	5
Traffic officer on duty less than 24 hr.....	29	..	13	2
Traffic signals operated less than 24 hr. daily.....	32	..	3	1
Automatic crossing bell....	9	5	17	15
Crossing gates (less than 24 hr.)	4	7	18	4
Wig-wag manually controlled	10	6	5	2
Not classified	112	19	58	28
Total	652	183	706	324

Another classification has been made according to the hour of the day at which accidents occur. It was found, for instance, that the majority, or 70 per cent to be more exact, of all grade crossing accidents occur during daylight hours. The visibility of approaching trains is always important in any study of crossing protection, and the commission made a study of its accident reports to determine the relative number of accidents at crossings where the view is obstructed and at crossings where the view is unobstructed. Owing to the fact that by far the greater number of crossings are unobstructed in respect to the view of an automobile driver on the highway, the accidents at such cross-

ings out-number those where the view of an automobile driver is obstructed. Another classification which the commission found to be very important was in respect to both the type of protection at the crossing and

Table C—Accidents Classified as to Type of Protection

Protection	No. of Accidents		
	1926	1927	1928
Crossing sign (only)	505	669	917
Automatic wig-wag	299	599	555
Human flagman (24 hr.).....	103	98	117
Human flagman (less than 24 hr.).....	14	16	89
Traffic officer (less than 24 hr.).....	13	14	40
Crossing gates (manual)	23	10	44
Traffic signals (operated for less than 24 hr. daily) .....	..	..	42
Crossing bell .....	..	..	40
Crossing gates (less than 24 hr.).....	6	9	22
Wig-wags (manually operated for less than 24 hr. daily)	22	29	2
Not classified	232	296	291
Total	1,217	1,740	2,179

Table D—Accidents Classified as to Type of Protection and Nature of Accident

Type of Protection	Nature of Accident			
	Struck by Head End of Train	Struck by Rear End of Train	Ran Into Moving Train	Ran Into Standing Train
Crossing sign	394	31	180	36
Wig-wag automatic	333	21	154	18
Suspended crossing sign.....	174	3	64	3
Human flagman (24 hr.)....	54	20	35	4
Human flagman on duty less than 24 hr. daily.....	53	3	23	6
Traffic officer on duty less than 24 hr. daily	38	..	12	6
Automatic crossing bell.....	23	3	11	2

the nature of the accident. Considerable significance is attached to the fact that the frequency of accidents caused by automobiles running into the sides of moving trains, as compared to the frequency of head-end collisions is, beyond a doubt, independent of the type of protection at the crossing. In so far as this statistical analysis may be able to prove anything, it surely proves the truth of the aforementioned statement.

City Streets Are Greatest Hazard

As shown in Fig. 3, by far the greater number of accidents occur in urban districts at the crossing of city streets with railroads at grade, in fact, 72 per cent

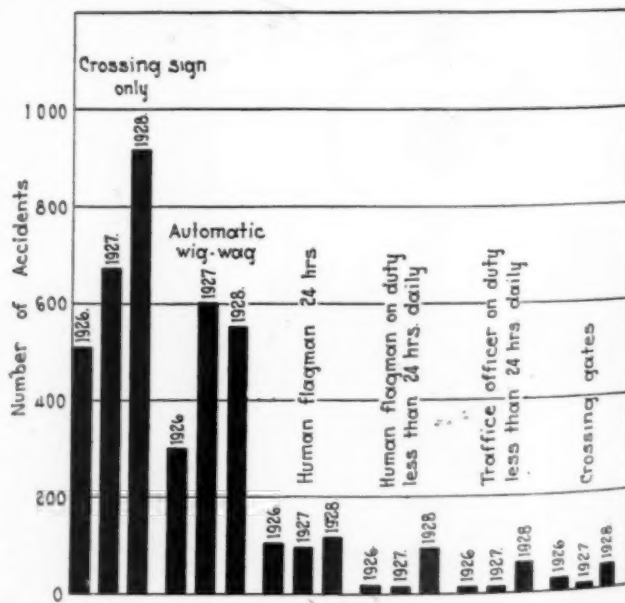


Fig. 5—Classification of Grade Crossing Accidents on Basis of Type of Protection at the Crossing

of all the accidents reported in 1928 occurred within incorporated cities of a population not less than 2,500 persons. Only 4.3 per cent of all the grade crossing accidents in 1928 occurred at crossings of state highways. It is thus indicated that the greatest efforts should be directed toward the protection of grade crossings within the corporate limits of cities and towns. This matter of location is also intimately tied up with the subject of visibility of approaching trains. In 1928 there were 706 accidents at crossings where the view was entirely unobstructed. That is, this fact was so reported at the time of the accident. In many cases, the report to the state commission did not indicate the visibility of trains from the highway. There were 652 accidents at crossings where it was reported that the view was obstructed. This information is given in Table B. It must be remembered that, although the greater number of accidents reported occurred at crossings where the view is unobstructed, such crossings greatly out-number those at which the view of the crossing is obstructed. It is also interesting to note that, although the number of accidents at obstructed crossings nearly approached the number at unobstructed crossings, the number of casualties was only 56 per cent as great at crossings where the view was obstructed, as at unobstructed crossings. This would indicate a greater traffic speed on highways where the view of the crossing is unobstructed. However, the majority of accidents occur at crossings of city streets, and hence the matter of obstructions to the view of automobile drivers is highly important and the problem of providing an effective daylight indication of the approach of a train is a difficult one.

Character of Grade Crossing Collisions

A great deal of publicity has been given of late to the large number of grade crossing accidents caused by the collision of an automobile with the side of a moving or standing train at the crossing. The statistics compiled by the commission indicate that 30.8 per cent of all accidents in 1928 were due to this cause, while about 27 per cent of all accidents for the past three years resulted from the same cause. Last year 1,310 automobiles were struck by the head end of a train, these accidents being 60 per cent of the 2,179 which occurred in 1928 (See Fig. 4). It is particularly significant that the side collisions were 50 per cent as great as the head-end collisions, or were nearly one-third of the total accidents at grade crossings.

It is hard to account for the fact that nearly one-



Center-of-Street Location With Concrete Safety Barrier to Protect Wig-Wag

third of all accidents are caused by a driver colliding with the side of a train. It would seem that braking distances are not adequate. However, tests conducted by the Bureau of Standards in 1925 indicated that the "mental reaction" time of an automobile driver is in the neighborhood of $\frac{1}{2}$ sec. During a time interval of $\frac{1}{2}$ sec. an automobile traveling at the rate of 30 m.p.h. on a highway will traverse a distance of 22 ft. In other words, from the instant that the signal is seen until the brake pedal is applied, the automobile has traveled 22 ft. At this speed the stopping distance for a car equipped with four-wheel brakes is approximately 50 ft. The total "mental reaction" and braking distance is thus 72 ft. The record seems to indicate that too many drivers wait too long before they decide definitely whether they are going to stop or proceed over the crossing ahead of the train. In most cases where an automobile strikes the side of a train it seems plausible to assume that the driver was a second or two too late in deciding whether to stop or proceed. It is an all

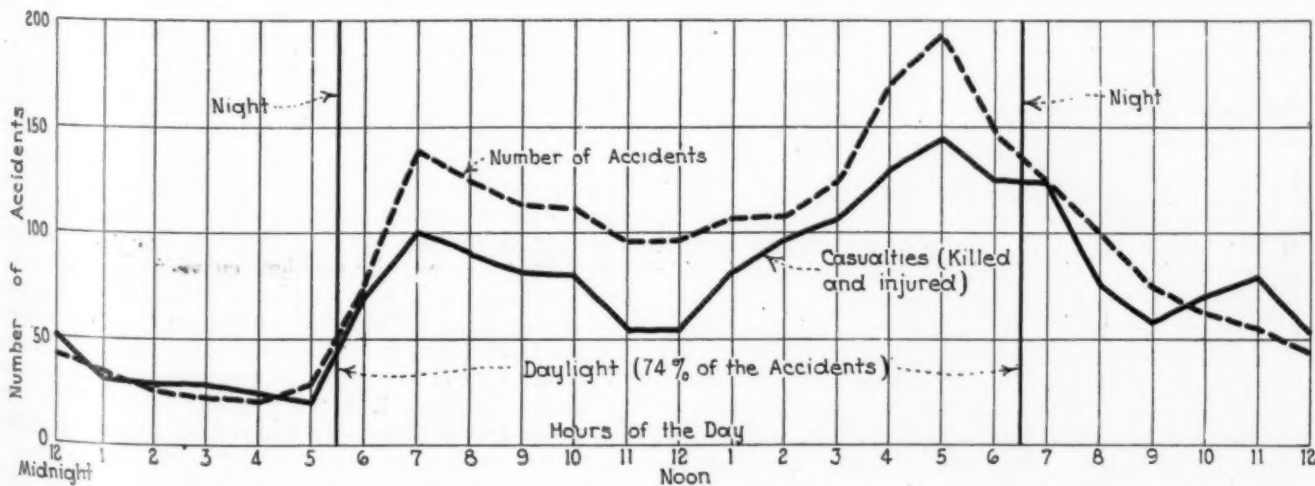


Fig. 6—Hourly Variation in Grade Crossing Accidents and Casualties for the Year 1928

too common experience to see automobiles crossing a railroad ahead of a train, even though a wig-wag is operating to warn of the approaching train. Apparently many people believe that life is too short to waste a few minutes waiting for a train to pass by.

Only comparatively few of the reports to the commission indicated the cause of the accidents. Of the 452 accidents in 1928, where a definite cause was given, 243 were attributed to the automobile stopping on the railroad right-of-way but not clearing the track. This number represented 53.8 per cent of the total number for which a cause was reported. A surprisingly large number (147) were reported as due to the driver becoming stalled on the railroad track or, in other words, about one-third of the accidents for which a specific cause was reported.

It was also reported that 62 accidents, or 13.7 per cent of all those for which causes were reported, were caused by impatient drivers proceeding onto the crossing of a double-track railroad as soon as the first train had cleared, without knowing whether or not a second train was approaching on the other track. Too frequently such drivers are struck by a second train running in the direction opposite to that of the train which first cleared the crossing. To help overcome this hazardous condition, an auxiliary warning signal known as a "second train indicator" is being tried out at a number of important crossings on the Southern Pacific. The "second train indicator" consists of both an audible and visible warning and is installed as an addition to existing wig-wag installations. A quick-vibrating bell, which gives a sound different from that of the ordinary wig-wag, is caused to ring when two trains are within the track circuits adjacent to the crossing; also, an illuminated sign is displayed, announcing to motorists that a train is approaching on the second track.

Automatically-operated crossing gates are also being tried and these provide a suitable warning and barrier if a "second train" approaches. The commission has had an automatic crossing gate installation in Burbank under observation for several months. This gate swings across the highway in a horizontal plane, displaying a visible warning by means of flashing lights and an audible warning by means of a bell or siren, to warn motorists of approaching trains and does not clear the highway until it is safe to do so. A different type of gate, installed in Illinois, known as the Standard Automatic signal gate, operates similarly to the gate installed at Burbank, but the Standard gate swings in a vertical plane instead of horizontally. From the information at hand, it appears that both types of automatic gates are working satisfactorily and it may well be that automatic gates will play an important part in the future as a protective device at grade crossings.

Type of Crossing Protection

Before analyzing the figures contained in Table C, it must be realized that automatic crossing protection of the wig-wag type is only provided at the busiest grade crossings. The accident hazard is considerably greater at those crossings protected with wig-wags than it is at the crossings having only the crossing sign; about one-fourth of the accidents in 1928 occurred at these crossings. It is encouraging to note that the number of grade crossing accidents at wig-wag protected crossings was reduced from 599 in 1927 to 555 in 1928, as shown in Fig. 5. Many of these cases are undoubtedly due to reckless driving, on account of the motor-

ists trying to beat the train to the crossing, and could have been prevented if the driver had stopped before attempting to cross in the face of a danger signal. A number of accidents have happened at crossings protected by part-time flagmen or gatemen during the period that such protection was not being provided. During the same period the accidents at crossings having only the crossing sign increased in amount from 669 to 917, the latter figure being 42 per cent of the total. This would indicate an increasing hazard at crossings protected by the sign only and points clearly to the need of some means of automatic protection at many of the crossings which now have only the signs.

Possibly Table C also indicates that the motoring public is better acquainted with the significance of the automatic wig-wag signal; more people now appreciate its meaning. All of the railroads have, during the last year, made progress in the installation and standardization of crossing signs and protection. Continuous study is being given and changes made in wig-wag installations, which will render the operation of the wig-wag more satisfactory as a grade crossing protective device. These changes particularly are in the track control circuits and in the connection of the wig-wag so that it will operate for train movements on side tracks. Control circuits are being revised and standardized so that the automatic signal will begin to function approximately 25 sec. in advance of the fastest train movement over the crossing.

Types of Protection and Nature of Accidents

One of the most interesting tables prepared by the commission is shown in abstract as Table D. In this an effort was made to classify the accidents both as to the type of protection provided at the crossing and as to the nature of the accident. Four classifications of accidents are given; namely, struck by head-end of train, struck by rear-end of train, ran into moving train and ran into standing train. One fact which seems to be clearly established by the figures in Table D is the irrelevancy of the type of protection and the frequency of side collisions as compared to head-end collisions with trains. It will be noted that the first and third columns show a remarkable agreement in respect to rank as determined by the number of accidents occurring as crossings with the type of protection respectively indicated. This no doubt is due, in part, to the fact that the commission has not as yet issued any general order requiring a warning device on each side of the track, at any crossing where automatic protection is necessary.

Hourly Variation in Accidents

Figure 6 shows the hourly variation in the number of accidents and of casualties at grade crossings during 1928. The most significant feature of the curve is the fact that 70 per cent of all the accidents occur during daylight hours. There is a morning peak from 7 to 8 o'clock and a higher peak in the late afternoon between 5 and 6 o'clock. There is also a noticeable agreement between the accident curve and the casualty curve. It can safely be assumed that the accident curve shown in Fig. 6 furnishes an excellent cross-section of the traffic density on the highways. In other words, it is only logical to expect the greatest number of accidents at the time that the greatest traffic density is found on the highways. In this respect the curve agrees favorably with the experience of traffic authorities.

It is clearly indicated by Fig. 6 that any method of

highway crossing protection must provide an effective daylight indication, regardless of how much more effective its night indication may be. This is not to minimize the importance of an effective indication at night, because it is realized that the individual hazard is greater at night, but more sizeable improvement will be shown if better daytime protection is provided. One way to do this is to instruct the freight and yard crews, when not using the main line, to keep the switches closed, so as to prevent unnecessary operation of warning devices. It is safe to assume that most automobile drivers are more careful at night than they are in the daytime, particularly in crossing a railroad and hence they pay more attention at such time to warning signals.

The commission also investigated the variation in grade crossing accidents with the month of the year. Owing to the favorable climate there is no decided seasonal variation in the density of highway traffic and in the number of grade crossing accidents. In 1928, May was the lowest month from the standpoint of accidents reported, while December was the highest. The respective figures are 115 and 255. It was also found that accidents at crossings are most likely on Saturdays, 372 accidents in 1928 taking place on a Saturday. Accidents on Sundays totaled only 261, this figure being the lowest for any day of the week. From the standpoint of accident hazard, the days of the week range as follows: Saturday, Friday, Thursday, Monday, Wednesday, Tuesday and Sunday.

As might be expected, passenger trains are the greatest accident hazard, 1,452 of all the grade crossing accidents in 1928 being caused by collisions with passenger trains, (see Fig. 4). This figure represents two-thirds of the total accidents. Only 399 or 18 per cent of all grade crossing accidents were caused by freight trains. An even smaller number, 235, or 10.8 per cent of the accidents, were caused by yard engines or yard switching movements. These figures are very significant, because if more publicity were given to them it might have a healthy effect on the mental attitude of most automobile drivers. Everyone dislikes the idea of being delayed at a railroad crossing until a long freight train goes by. At 20 m.p.h. an 80-car freight train will delay highway traffic about 4 min., including the warning period of the wig-wag. While such delays, of course, are unavoidable, it must be remembered that over two-thirds of all grade crossing accidents are caused by passenger trains and a 10-car passenger train moving at 60 m.p.h. delays highway traffic only 30 sec. Hence, even though life may be short it is not so short but what it is well to wait 30 sec. or more until a passenger train clears the crossing.

In 63 per cent of the accidents, there was only one person in the vehicle. It is interesting to compare this record with the average number of persons actually riding in vehicles, as developed through counts of travel, which is in the neighborhood of two persons in each vehicle. It is apparent, therefore, that a proportionately greater number of grade crossing accidents occur where one person only is in the vehicle than when two or more persons are present. This would lead to the conclusion that a motorist, when driving alone, is more liable to have an accident than when he is accompanied by one or more persons.

Future Trend in Protection

The so-called "Hoover Conference Committee" was organized to study and recommend regulations looking toward the reduction of grade crossing accidents in the

United States. This committee proposed a number of regulations, two of which are quoted:

"Section 5—Whenever any person driving a vehicle approaches a highway and interurban or steam railway grade crossing and a clearly visible and positive signal gives warning of the immediate approach of a railway train or car, it shall be unlawful for the driver of the vehicle to fail to bring the vehicle to a complete stop before traversing such grade crossing.

"Section 6—The state highway commission is hereby authorized to designate particularly dangerous grade crossings of steam or interurban railways by highways and to erect signs thereat notifying drivers of vehicles upon any such highway to come to a complete stop before crossing such railway tracks, and whenever any such crossing is so designated and sign-posted, it shall be unlawful for the driver of any vehicle to fail to stop within 50 ft., but not less than 10 ft. from such railway tracks before traversing such crossing."

Up to the present time, California has no such provisions in its Motor Vehicle Act; however, there is a move to have the present legislature pass certain such laws.

All steam and electric interurban railways are required, by General Order No. 22A, effective July 1, 1928, to furnish the commission a record of all accidents occurring at grade crossings on their respective lines. This general order requires that the carriers shall notify the commission, by telephone or telegraph, of all accidents resulting in the loss of life or serious injury to persons and, in addition, make written reports as specified by this order. These last mentioned reports are made on what is termed a "self-coding" form to facilitate the operation of the Hollerith tabulating system. This affords a convenient method of segregating the accidents into various classes and makes it possible to obtain many desirable classifications and combinations of accident records. Clerks prepare a "coded" record card for each accident report and these are sorted in the Hollerith automatic tabulator.

* * *



A Pennsylvania Passenger Train at Clark Junction, Ind.

Railways Reduce Inventories

Railway Age summary shows practically all roads attacking stock piles—Best record since the war

THE railroads of the United States had over fifty-three million dollars less capital tied up in fuel, rail, ties and all other unapplied materials and supplies at the close of 1928 than at the close of 1927, according to the *Railway Age's* analysis of the annual reports of Class I carriers filed with the Interstate Commerce Commission. As many as 85 out of 117 roads, or systems of roads, reduced their stocks and the reductions exceeded a million dollars on 19 of the roads listed, with an increase of a million dollars or more on but one road. The total value of materials carried in stock by these roads at the close of 1928 was \$471,889,894, as compared to \$525,180,964 at the close of 1927, a decrease of \$53,291,000, including a reduction in storage stocks of fuel of approximately \$15,000,000. The stock is less than was carried at the close of any year since 1916 although operating expenses and also railway business as measured by revenue-ton miles, have increased substantially.

The inventories of Class I roads at the close of each year since 1916, and the increases or decreases, are given in Table I, while in Table II are given the values of unapplied materials reported by the individual roads for 1927 and 1928, with the increases or reductions in each case.

In many instances the supplies carried in stock by one road are, in part or as a whole, available to other roads in the same system, and the supplies reported separately by several companies are sometimes acquired and handled by the same organization. In order that the figures reported by individual roads may facilitate comparisons, the plan has been followed, as far as practicable, of grouping inventories of the different units of a system where they were grouped in the reports filed with the commission. The consolidations made in preparing Table II are:

Atchison, Topeka & Santa Fe; Gulf, Colorado & Santa Fe; and Panhandle & Santa Fe.

Atlanta & West Point; Georgia Railroad and Western Railway of Alabama.

Atlantic Coast Line and Charleston & Western Carolina.

Chicago, Rock Island & Pacific and Chicago, Rock Island & Gulf.

Table I—Supplies on Class I Railways—1916 to 1928

Year	Stocks on Hand End of Year	Increase or Decrease from Previous Year
1916	\$323,556,387	
1917	502,986,042	+\$179,429,655
1918	630,207,210*	+127,221,168
1919	597,573,735*	+35,633,475
1920	755,563,278	+157,989,543
1921	665,147,099	-99,415,179
1922	546,284,853	-118,862,246
1923	682,725,812	+136,440,959
1924	560,048,899	-122,676,913
1925	525,853,107	-34,195,792
1926	551,694,794	+25,841,689
1927	523,650,986	-28,043,808
1927	525,180,964**	
1928	471,889,894**	-53,291,070

* Estimated for Class I railways on years of government operation on the basis of stocks held by all railways.

** Total for roads shown in Table II.

Note: The plus sign (+) opposite figures in third column signifies an increase.



In the New Store of the Florida East Coast

Baltimore & Ohio; Cincinnati, Indianapolis & Western; and Staten Island.

Cleveland, Cincinnati, Chicago, St. Louis; Cincinnati Northern; and the Evansville, Indianapolis & Terre Haute, which are grouped with the Michigan Central, New York Central and Pittsburgh & Lake Erie.

Erie; Chicago & Erie; New Jersey & New York; and New York, Susquehanna & Western.

Illinois Central; Gulf & Ship Island; and Yazoo & Mississippi Valley.

Kansas City, Mexico & Orient and Kansas City, Mexico & Orient of Texas.

Louisiana Railway & Navigation Company and Louisiana Railway & Navigation Company of Texas.

Minneapolis, St. Paul & Sault Ste. Marie, and Duluth, South Shore & Atlantic.

Reading; the Atlantic City and the Port Reading.

St. Louis Southwestern, and St. Louis Southwestern of Texas.

Southern; Alabama Great Southern; Cincinnati, New Orleans & Texas Pacific; Georgia, Southern & Florida; New Orleans & Northeastern; and the Northern Alabama.

Pennsylvania; West Jersey & Sea Shore; and the Baltimore, Chesapeake & Atlantic.

The Missouri Pacific; the International-Great Northern; and the Gulf Coast Lines, the latter including the New Orleans, Texas & Mexico; St. Louis, Brownsville & Mexico; San Antonio, Uvalde & Gulf; and the Beaumont, Sour Lake & Western.

The St. Louis-San Francisco and St. Louis-San Francisco of Texas, and the Fort Worth & Rio Grande.

Union Pacific; Los Angeles & Salt Lake; Oregon Short Line; Oregon-Washington Railway & Navigation Company; and St. Joseph & Grand Island.

Reductions on 85 Roads

For comparative purposes, the value of material and supplies on hand at the close of 1928 is given for each

system and also the value of material and supplies on hand at the close of the preceding year, determined in the same way. Out of 117 carriers, there were reductions in stock on 85 and increases on 31 roads.

Reductions in excess of a million dollars were made on 19 roads. The largest reduction took place on the Pennsylvania Lines, where the material balance at the close of 1928 was \$6,639,252 less than at the close of 1927, not including the Long Island. Next to the Pennsylvania were the New York Central Lines, with a reduction of \$5,675,000, while the Louisville & Nashville was third with a reduction of \$4,005,958. The Illinois Central effected a reduction of \$3,831,313; the Norfolk & Western, \$3,643,904; the Southern System, \$2,977,493; the Erie, \$2,879,174; and the Baltimore & Ohio, \$2,366,388.

C. & O. and D., L. & W. Have Lowest Indexes

Comparisons of the efficiency with which indifferent railroads handle unapplied materials, based on the value of stock carried alone, must be made with caution, not only because of different physical and operating conditions of the carriers and their distance from sources of supply, but also because the policies and practices governing the purchase and storage of fuel, rail and ties, differ from those governing the purchase and storage of miscellaneous materials. Up to the present, these major items of expense are not reported separately.

There has been much criticism of the ratio which the material and supplies carried in stock by a railroad bears to the annual operating expense as a measure of the stock carried. It is commonly objected that this ratio is likely to be unfair. An index based on the rate at which supplies are turned over, determined by comparing the materials on hand with the materials consumed, is preferred, and a number of railroads, through the Purchases & Stores Division of the American Railway Association, have adopted the practice of unofficially comparing their stocks with each other on this basis. On account of the impracticability of developing such an index for all roads at present, however, and because the operating expense ratio is the best single index available at present for all roads, its use is continued in the summaries which the *Railway Age* has been publishing each year.

In each instance, the annual operating expenses of the various properties have been grouped and consolidated in the same way as in determining the inventories. The compilation shows ratios ranging from 3.8 per cent

of annual operating expenses to 27 per cent, with the Chesapeake & Ohio and the Delaware, Lackawanna & Western leading the group of roads having a thousand miles or more of main line, with balances at the close of 1928 representing only 4.6 per cent and 4.9 per cent of their annual operating expenses, respectively.

Out of 117 roads reported, there were 56 cases in which the ratio for 1928 was less than for 1927, and there were 39 roads whose ratios were below 10 per cent, including (besides the Long Island, Chesapeake & Ohio and Delaware, Lackawanna & Western) the Hocking Valley, with a ratio of 5.3 per cent; the Chicago & Alton, 5.4 per cent; the Erie, 5.6 per cent; the Chicago Great Western, 6 per cent; the Chicago & Eastern Illinois, 6.2 per cent; the Bessemer & Lake Erie, 6 per cent; the Chicago, Indianapolis & Louisville, 6 per cent; the Chicago, Rock Island & Pacific, 8.5 per cent; the Elgin, Joliet & Eastern, 7.1 per cent; the Illinois Central, 7.4 per cent; the Mobile & Ohio, 8.5 per cent; the New York Central Lines, 9.9 per cent; the Pennsylvania, 8 per cent; the Pere Marquette, 8.8 per cent; the St. Louis-San Francisco, 9 per cent; the Union Pacific, 9.5 per cent, and the Wheeling & Lake Erie, 7.6 per cent.

Reductions Reflect Stores Efficiency

The reductions in stock in rail inventories that were made last year and in previous years are almost entirely the result of the vigorous drive which the railway supply departments have been making to enlarge upon the efficiency of their operations, including the simplifying of stores and improved material handling methods, and taking advantage of the faster and more reliable deliveries that can be made under present manufacturing conditions and improved transportation.

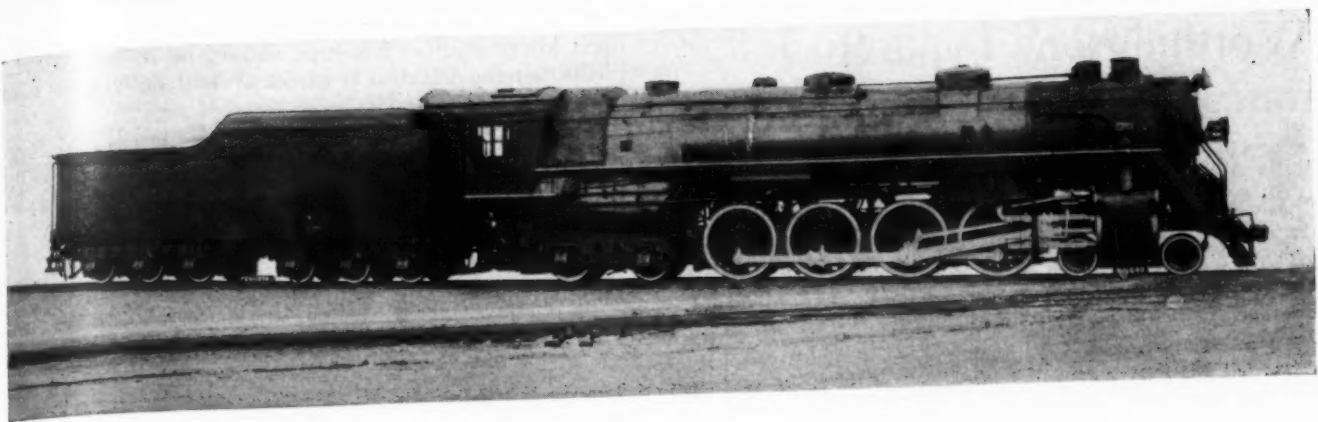
A striking example of the attention which supply departments are giving to reducing inventories, and the success obtained in this work, is furnished by the Delaware, Lackawanna & Western. This road, according to the figures which have been received from the general storekeeper, has reduced its inventories of all materials carried on hand at the close of the year from the ratio to operating expenses of 6.14 per cent in 1926, to 5.20 per cent in 1927, and 4.88 per cent in 1928, while the inventory of store department materials alone (which do not include fuel, commissary supplies, rail, cross and switch ties, track materials and cement), was reduced from an average month's supply for the year, of 2.65 in 1925 to 1.98 in 1926, 1.94 in 1927, and 1.69 in 1928.

Table II—Material and Supplies Carried In 1927 and 1928

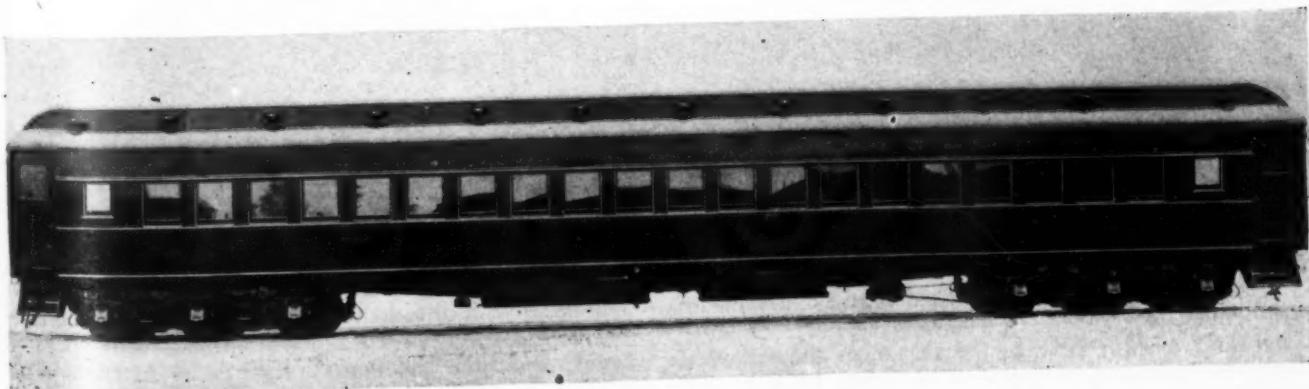
	Dec. 31, 1928	On Hand		Reduction	Per Cent of Operating Expenses	
		Dec. 31, 1927	Dec. 31, 1927		1928-1927	1928-1927
Akron, Canton & Youngstown	\$205,613	\$163,308	\$163,308	+\$42,305	8.9	7.8
Ann Arbor	472,226	500,444	500,444	28,218	10.6	11.5
Atchison, Topeka & Santa Fe Lines	28,741,516	29,774,215	29,774,215	1,032,699	16.8	16.6
Atlanta & West Point Lines	1,457,995	1,442,856	1,442,856	+15,139	15.8	15.3
Atlanta, Birmingham & Coast	589,710	785,075	785,075	195,365	12.8	15.8
Atlantic Coast Lines	6,912,130	8,453,850	8,453,850	1,541,720	11.8	12.3
Baltimore & Ohio	18,333,817	20,700,205	20,700,205	2,366,388	10.5	10.3
Bangor & Aroostook	919,648	824,583	824,583	+95,065	18.5	16.6
Bessemer & Lake Erie	555,270	797,966	797,966	242,696	6.0	8.3
Boston & Maine	6,476,704	6,849,778	6,849,778	373,074	11.3	11.1
Buffalo & Susquehanna	192,913	159,843	159,843	+33,070	13.1	10.3
Buffalo, Rochester & Pittsburgh	1,380,035	2,024,423	2,024,423	644,388	10.1	13.1
Central of Georgia	1,684,882	2,040,654	2,040,654	355,772	8.8	9.8
Central of New Jersey	3,224,377	4,307,010	4,307,010	1,082,633	7.7	9.9
Chesapeake & Ohio	3,802,615	4,964,772	4,964,772	1,162,157	4.6	5.6
Chicago & Alton	1,233,093	1,294,092	1,294,092	60,999	5.4	5.8
Chicago & Eastern Illinois	1,200,007	1,342,922	1,342,922	142,915	6.2	6.2
Chicago & Illinois Midland	229,145	288,053	288,053	58,908	10.7	12.5
Chicago & North Western	12,064,384	12,564,849	12,564,849	500,465	10.3	10.8
Chicago, Burlington & Quincy	14,555,426	12,487,544	12,487,544	+2,067,882	12.7	11.2
Chicago Great Western	1,160,887	1,613,103	1,613,103	452,216	6.0	8.2
Chicago, Indianapolis & Louisville	1,174,939	1,198,694	1,198,694	23,755	8.9	8.8
Chicago, Milwaukee, St. Paul & Pacific	12,872,138	13,507,305	13,507,305	635,167	10.2	10.1
Chicago, Rock Island & Pacific Lines	8,850,907	8,866,374	8,866,374	15,467	8.5	8.5
Chicago, St. Paul, Minneapolis & Omaha	2,618,691	2,644,948	2,644,948	26,257	11.3	12.2
Clinchfield	855,772	903,697	903,697	47,925	20.2	17.8

NOTE: The plus sign (+) opposite figures in third column signifies an increase.

	Dec. 31, 1928	On Hand Dec. 31, 1927	Reduction	Per Cent of Oper- ating Expenses 1928-1927	
Colorado & Southern	906,086	960,672	54,586	9.9	9.0
Columbus & Greenville	182,865	188,309	5,444	12.2	12.1
Delaware & Hudson	4,180,384	3,452,445	+727,939	13.2	10.0
Delaware, Lackawanna & Western	2,830,533	3,131,790	301,257	4.9	5.2
Denver & Rio Grande Western	3,187,295	2,900,118	+287,177	13.0	11.5
Denver & Salt Lake	440,415	449,546	9,131	17.4	13.3
Detroit & Mackinac	330,340	288,870	+41,470	26.8	23.0
Detroit & Toledo Shore Line	244,165	245,952	1,787	10.2	10.3
Detroit, Toledo & Ironton	705,968	429,763	+276,205	10.2	6.2
Duluth & Iron Range	678,486	701,310	22,824	15.4	15.0
Duluth, Missabe & Northern	1,082,829	1,341,826	258,997	15.1	17.2
Elgin, Joliet & Eastern	1,187,401	1,240,459	53,058	7.1	7.3
Erie System	5,830,533	8,709,707	2,879,174	5.8	8.3
Florida East Coast	2,690,629	3,643,075	952,446	27.1	25.4
Fort Smith & Western	203,979	228,804	24,825	15.8	16.1
Fort Worth & Denver City	725,018	1,031,579	306,561	10.2	12.2
Georgia & Florida	113,243	128,690	15,447	8.3	8.5
Great Northern	10,814,296	10,404,003	+410,293	13.0	13.3
Green Bay & Western	321,409	309,855	+11,554	24.0	25.2
Gulf, Mobile & Northern	577,775	746,096	168,321	10.7	14.0
Hocking Valley	670,849	916,947	246,098	5.3	6.8
Illinois Central System	10,380,598	14,211,911	3,831,313	7.4	9.7
Kansas City, Mexico & Orient Lines	1,125,863	611,561	+514,302	13.9	6.9
Kansas City Southern Lines	1,956,953	2,272,132	315,179	13.9	15.4
Lake Superior & Ishpeming	254,651	238,494	+16,157	17.5	17.5
Lehigh & Hudson River	125,805	195,987	70,182	6.8	8.5
Lehigh & New England	441,367	428,665	+12,702	11.1	10.6
Lehigh Valley	5,158,290	6,523,267	1,364,977	9.6	11.0
Long Island	1,071,167	2,197,095	1,125,928	3.8	7.3
Louisiana & Arkansas	479,576	447,263	+32,313	19.5	16.5
Louisiana Ry. & Navigation Lines	426,964	539,156	112,192	11.5	14.4
Louisville & Nashville	11,214,919	15,220,877	4,005,958	14.3	14.4
Louisville, Henderson & St. Louis	196,693	272,492	75,799	7.4	9.1
Maine Central	1,822,603	1,769,130	+53,473	12.1	11.0
Midland Valley	\$232,024	\$357,604	\$125,580	10.5	14.2
Minneapolis & St. Louis	1,344,365	1,376,781	32,416	10.8	10.7
Minneapolis, St. Paul & Sault Ste. Marie Lines	5,097,842	4,369,133	+728,709	12.5	11.2
Mississippi Central	91,055	109,946	18,891	7.7	9.1
Missouri & North Arkansas	152,086	176,223	24,137	10.0	11.3
Missouri-Kansas-Texas Lines	5,518,510	6,350,302	831,792	14.2	16.1
Missouri Pacific Lines	15,679,584	18,478,625	2,799,041	12.2	14.4
International Great Northern	2,396,113	3,293,305	897,192	16.3	22.0
Gulf Coast Lines	1,947,722	2,949,481	1,001,759	16.0	21.8
Missouri Pacific	11,335,749	12,235,839	900,090	11.5	12.3
Mobile & Ohio	1,109,942	1,330,718	220,776	8.5	9.8
Monongahela	384,100	381,088	+3,012	10.1	9.7
Montour	126,757	112,871	+13,886	9.6	9.2
Nashville, Chattanooga & St. Louis	1,918,372	2,439,155	520,783	10.5	13.3
Nevada Northern	137,537	138,574	1,037	26.6	29.3
New Orleans Great Northern	187,207	208,158	20,951	8.5	8.9
New York Central Lines	44,006,280	49,681,280	5,675,000	9.9	12.2
Cleveland, Cincinnati, Chicago & St. Louis	6,848,044	7,823,870	975,826	9.5	10.4
Michigan Central	6,254,904	6,169,093	+85,811	10.0	9.9
New York Central	28,221,596	32,388,782	4,167,186	9.8	11.0
Pittsburgh & Lake Erie	2,681,736	3,299,515	617,779	10.4	12.5
New York, Chicago & St. Louis	3,322,640	3,266,289	+56,351	8.8	8.5
New York, New Haven & Hartford	11,470,536	14,074,291	2,603,755	12.2	13.7
New York, Ontario & Western	1,236,669	1,657,654	420,985	11.6	15.2
Norfolk & Western	10,218,722	13,862,626	3,643,904	15.3	19.8
Norfolk Southern	733,428	718,421	+15,007	11.2	10.5
Northern Pacific	11,353,490	11,653,089	299,599	16.0	17.2
Northwestern Pacific	737,284	647,151	+90,133	12.8	12.1
Pennsylvania System	40,753,053	47,392,305	6,639,252	8.4	9.1
Pere Marquette	2,743,044	3,227,021	483,977	8.8	10.2
Pittsburgh & Lake Erie	2,681,736	3,299,515	617,779	10.4	12.5
Pittsburgh & Shawmut	123,523	141,694	18,171	9.4	9.5
Pittsburgh & West Virginia	118,520	180,809	62,289	4.6	7.5
Pittsburgh, Shawmut & Northern	208,427	244,160	35,733	13.8	15.9
Reading System	8,023,549	8,235,686	212,137	10.8	10.6
Richmond, Fredericksburg & Potomac	1,244,263	1,304,134	59,871	16.0	15.5
Rutland	715,462	942,574	227,112	13.4	16.9
St. Louis-San Francisco Lines	5,348,795	4,911,023	+437,772	9.0	8.0
St. Louis Southwestern Lines	4,851,592	4,413,502	+438,090	31.6	23.8
Seaboard Air Line	3,979,867	5,558,179	1,578,312	9.3	11.9
Southern System	12,448,866	15,426,359	2,977,493	9.4	11.4
Southern Pacific-Pacific System	25,652,659	27,599,510	1,946,851	17.0	17.2
Southern Pacific, Texas & La. Lines	7,157,823	8,277,498	1,119,675	13.0	14.2
Spokane, Portland & Seattle	970,625	767,863	+202,762	16.5	14.3
Tennessee Central	338,057	359,215	21,158	13.2	13.3
Texas & Pacific	5,571,001	4,102,506	+1,468,495	16.1	14.3
Trinity & Brazos Valley	329,656	390,090	60,434	15.6	15.8
Ulster & Delaware	175,109	171,083	+4,026	13.8	17.0
Union Pacific System	16,266,338	16,413,793	147,455	10.8	11.5
Los Angeles & Salt Lake	1,850,779	1,905,890	55,111	9.4	9.3
Oregon Short Line	3,524,516	3,500,917	+23,599	13.8	14.3
Oregon-Washington Ry. & Nav.	3,214,258	2,643,038	+571,220	15.7	10.8
St. Joseph & Grand Island	270,234	411,554	141,320	9.7	10.7
Union Pacific	7,406,551	7,952,399	545,848	20.3	19.6
Virginian	2,085,266	2,288,537	203,271	8.9	9.4
Wabash	4,691,575	4,805,118	113,543	15.9	16.5
Western Maryland	2,010,133	2,477,676	467,543	20.0	19.8
Western Pacific	2,834,606	2,609,091	+225,515	7.6	9.4
Wheeling & Lake Erie	1,052,404	1,280,923	228,519	13.3	9.0
Wichita Valley	130,728	92,712	+38,016		



**NEW
AND IMPROVED
DEVICES FOR
LOCOMOTIVES
AND CARS**



Worthington Type S Feedwater Heater

THE Worthington Pump & Machinery Corporation, Harrison, N. J., has placed on the market a new type of feedwater heater which differs from the unit construction of the Standard BL type in that it is designed in three units; namely, a hot-water pump, a cold-water pump and steam turbine, and the feedwater heater unit. The Type S offers advantages in total weight reduction and weight distribution.

The cold-water pump, mounted under the left side of the cab, takes water from the tender and delivers it to the heater which is set into the top of the smoke box. Here the water is heated by mixing with exhaust steam from the locomotive cylinders. From the heater, the hot water flows down to the hot-water pump, mounted on the side of the boiler. The hot water pump forces the heated water into the boiler through the boiler check.

The cold-water pump is a standard Worthington centrifugal pump driven by a low-speed Pyle-National steam turbine. The turbine is equipped with the regular Pyle-National governor, identical with that used on generator sets for train lighting and automatic train control, and runs at a constant speed.

The cold water is delivered to the heater through a float-operated water-control valve, and a spring-loaded spray valve. The amount of water passing through the water-control valve depends on the level of the water in the heater. When the water level is low and the float is down, the valve is open and admitting cold water to the heater. As the water level rises the float rises, gradually closing the water-control valve. If the water level is then lowered, the float descends and opens the valve again. Thus the water-control valve will always be open just a sufficient amount to supply the hot-water pump for the speed at which it is operating.

Exhaust steam from the locomotive, entering the heater, passes upward through an exhaust check valve of multiple self-grinding cup type which is a part of

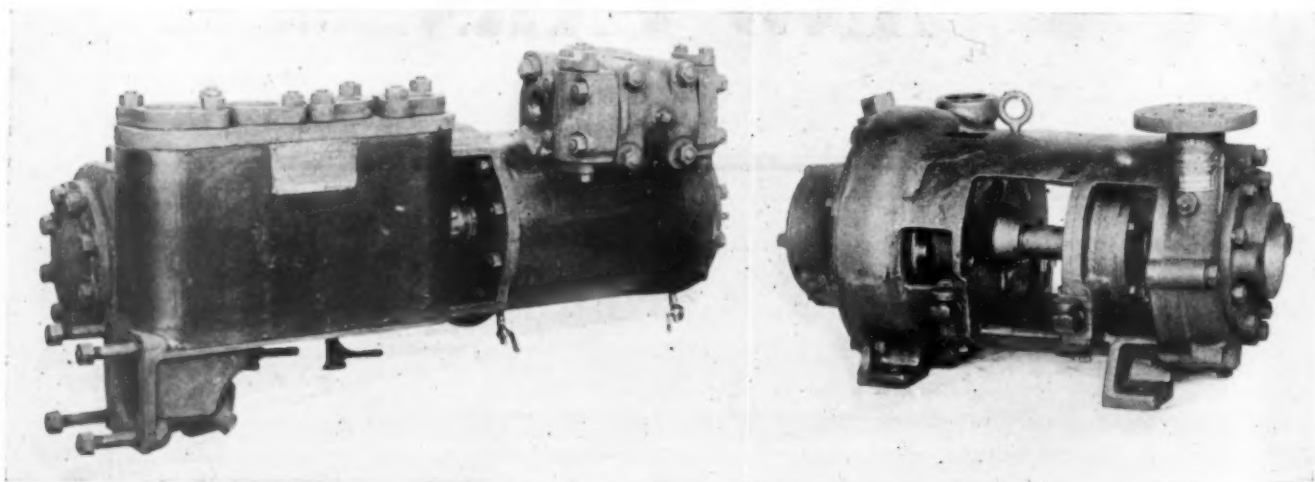
open lower end of this pipe should be in a convenient position near the track where it will be visible when the pumps are tested.

The hot water pump is a single horizontal long-stroke piston pump, having enclosed valve gear. As the speed of the cold-water pump is constant, and the water level in the heater is automatically controlled by the float, the rate of feeding the boiler depends entirely upon the speed at which the hot water pump is operated. This is controlled by a throttle valve in the cab.



The Heater Unit of the Worthington Type S Feedwater Heater

The drifting control valve is placed in the exhaust pipe of the hot-water pump. It is a device which prevents the pump from being run fast while the engine is standing or drifting. It relieves the engineman of the necessity of closing the feed-pump throttle valve when making a stop or of shutting it off for drifting. The



Left—The Hot-Water Pump; Right—The Cold-Water Pump and the Steam Turbine

the heater. The individual valves have spherical seating surfaces, so as to seat in any down position. Their movement is free and the spherical seating surfaces insure against leakage.

An air-vent pipe permits the escape of the air which separates from the water as it is being heated. The

engineman need pay no attention to the feed pump until the stop has been made, and he is ready to shut it off. The pump will automatically slow down when the locomotive throttle is closed and will automatically speed up again when the locomotive throttle is opened. This valve is controlled by live-steam pressure from one of

the side pipes, led to the valve by a $\frac{3}{8}$ -in. pipe.

The drifting control valve is adjusted at the factory to open when the locomotive steam-pipe pressure reaches 50 lb. and to close when the pressure is reduced to slightly below 50 lb. It requires no attention other than to see that the spring is so adjusted that the valve opens when the steam-chest pressure is slightly above locomotive drifting-throttle pressure. When the valve is open, exhaust steam from the steam cylinder of the hot-water pump passes freely through it, unrestricted, to the heater. When the valve is closed the exhaust from the hot-water pump must pass through a small orifice inside of the valve body.

The drifting control valve is adjusted by removing a cap nut and turning an adjusting screw. Turning the screw to the right makes the valve open and close at higher pressure. Turning the screw to the left makes it open and close at a lower pressure.

The gage in the cab is connected to the discharge pipe of the feed pump, and indicates by a movement of its hand whether the hot-water pump is running and how fast. Each forward motion of the hand indicates one stroke of the pump. A three-way self-cleaning cock, having a $\frac{1}{64}$ -in. choke is furnished with the gage. In the operating position the water has to pass through this choke, which reduces the throw of the hand to an amount that will not injure the gage. In the cleaning position the choke is open to the atmosphere, and the pressure of the water forces out any obstruction and clears it.

The cleaning port should always be directed toward the boiler head so that any discharge will be directed away from the occupants of the cab.

Two steam strainers are furnished with each equipment. One is located in the live-steam pipe of the cold-water pump and one in the live-steam pipe of the hot-water pump. These strainers remove all chips and other foreign matter in the live steam and prevent them from entering either the steam turbine or the cylinder of the hot-water pump. These steam strainers should be blown out every few days, by opening the clean-out valves on them while the pumps are running.

A safety valve is furnished in the exhaust pipe of the hot-water pump between the drifting control valve and the heater to relieve any excess pressure in the heater. This valve is set at 45 lb. and sealed, and its outlet is piped down to a point near the track.

The pump throttle valve is of the cone seated type with a Monel metal disc and seat. The starting valve is a full area globe valve, with a Monel metal disc and seat.

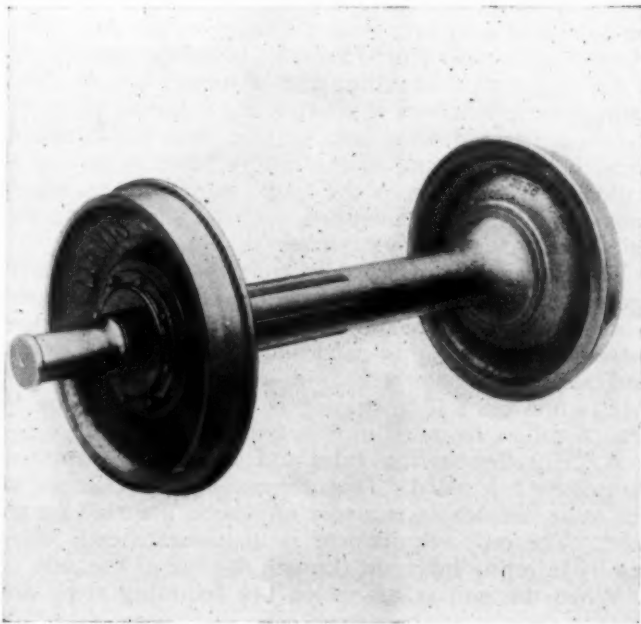
Fabrikoid Material for Window Curtains

A RECENT development in railroad cars is the use of pyroxylin-coated window curtain of Fabrikoid, a product of E. I. du Pont de Nemours & Co., Newburgh, N. Y. Made from the same basic materials as Duco, Fabrikoid is suitable for this particular purpose, as it is waterproof, sanitary and durable. Finger marks and other soil resulting from constant use wash off quickly with soap and water. It is not affected by being continually exposed to heat and extreme cold. When railroad car windows are open, the pyroxylin-coated curtains are not harmed by the elements. It is claimed that they cannot be harmed by driving winds, rain, snow or heat. They may be had in several colors and designs.

Self-Contained Roller Bearing Application

AN application of roller-bearings for railway equipment, that has been under test by the American Steel Foundries, Wrigley Building, Chicago, for close to three years is similar to the roller bearing mounting found in line shafts or automobiles. The advantages of this design as demonstrated in actual service and through extensive testing, have led the manufacturers to put the new unit into production and offer it to railways for passenger cars, locomotive lead, trailer and tender trucks and freight cars.

This roller bearing unit which was mentioned in the



The Roller-Bearing Unit Completely Assembled

June 26, 1928, Daily Edition of the *Railway Age*, consists essentially of a stationary axle and a tubular housing on which wheels are rigidly mounted. The axle transmits the load from the journal box or truck frame through the roller bearings to the axle housing, which usually only serves as a filler and wheel spacer, passing the load from the roller bearings to the wheels and thence to the track.

The roller-bearing application is essentially that found in the front wheels of automobiles, viz: single sets of rollers mounted in opposition to each other within the hub of the wheel.

The unit is made so that it can be furnished with either Timken, S.K.F. or Shafer roller bearings, while any make of wheels can be supplied.

Since this application is a self-contained unit, it is fully interchangeable as an assembly with the A.R.A. wheel and axle assembly. This interchangeability means that the A.S.F. unit is placed under a car in exactly the same manner as A.R.A. wheel and axle assemblies.

The axle is nominally stationary and is subjected to the same bending moments due to vertical load, as the A.R.A. axle, but receives reduced bending moments due to lateral thrusts. It has therefore, a somewhat lower fibre stress than the A.R.A. axle under similar duty, while it is not subjected to the constant quick reversal of stresses that the revolving A.R.A. axle encounters. Each end of the axle is furnished with a fitting for receiving

the nozzle of an oil gun with which the roller bearings are lubricated.

The tubular axle housing rigidly connects the two wheels. Since the load is carried vertically through rollers, roller cups and wheel to the rail, vertical loads cause no bending stresses in the axle housing. It is stressed only by flange pressures. This axle housing is designed with the same strength as an A.R.A. axle throughout its length so that the maximum unit fibre stress under any conditions is far less than that imposed on standard A.R.A. axles. For passenger service this axle housing can be furnished with pulley hub seats for mounting an axle-light pulley.

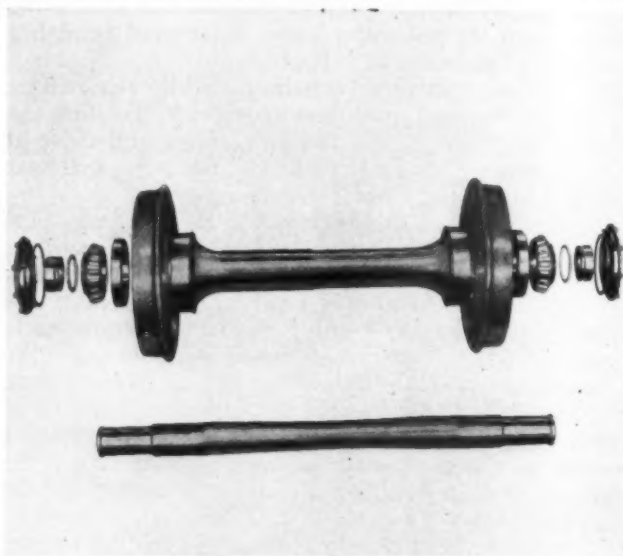
Either Davis, wrought steel, chilled iron, or steel tired wheels may be furnished as a part of the A.S.F. units. Since the hub bore is approximately double that of an A.R.A. standard wheel, the lateral forces applied to the wheel, or flange pressure, is greatly reduced because of the decreased lever arm from the flange to the hub. The wheel of this unit is from 75 to 150 lb. lighter than wheels of the same capacity fitting the standard A.R.A. axle. Although the hub bore is shorter, the diameter is larger and so it has a greater holding area than the standard wheel. The inner end of the hub is faced to project a standard distance from the gage point on the wheel flange, and the hub is mounted against a shoulder on the axle housing.

The three types of standard roller bearings that have been approved for application to the unit are of designs worked out and recommended by the roller bearing manufacturers for this particular usage. The Timken and Shafer bearings are of a single-race, double-duty type, while the S.K.F. bearing is furnished with double sets of rollers mounted in each end of the unit.

A.S.F. roller-bearing axles and wheels are furnished completely assembled. They are ready for installation in the same manner as any pair of wheels mounted on an axle. The only requirement is to lubricate each bearing by injecting lubricant through the end of the axle.

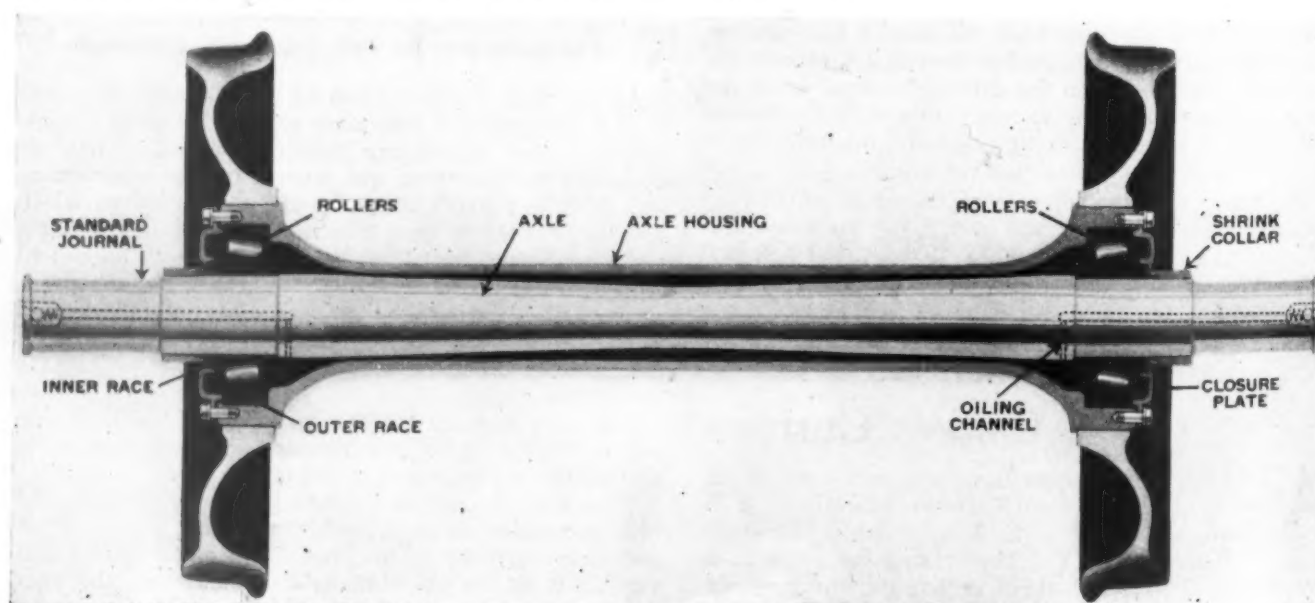
When the unit is assembled the following steps are

ing is then mounted on the axle in the same manner as an A.R.A. wheel. The locking collar is expanded by a torch and shrunk on the axle directly against the roller-bearing cone. The axle with its one cone and roller assembly is placed in the axle housing and wheel assembly and the second bearing-cone and roller assembly is pressed on the other end of the axle. At this time the proper adjustment of the bearings must be obtained. A micrometer dial gage is used to check the adjustment of the bearing, determined by the end movement of the



The Parts of an A. S. F. Roller-Bearing Unit

axle within the assembly. In case the adjustment is too loose a hand tool which forces the cone and roller assembly further on the axle is used and in case the adjustment is too tight another tool is used to draw it back. After the adjustment is known to be correct, the second locking collar is shrunk on the axle to maintain this permanent adjustment.



Sectional View of A. S. F. Roller-Bearing Unit

taken: The outer roller-bearing races or cups are pressed into the axle housing, using the ordinary wheel press. The wheels are pressed on the axle housing until they come in contact with the shoulder of the housings. One inner race or cone and roller assembly of the bear-

The gaskets are next placed in position and the closure plates bolted on. The baffle rings are then snapped on the shrink collar, completing the assembly.

This roller bearing application does not disturb the existing standard relation of the parts in the journal

box, allowing for lateral movement in exactly the way that has been found best in the years of experience with railway rolling stock. It places the roller bearings rigidly on the axle in such a way that the relative position of rollers and races is unvarying and always permits the bearings to operate at maximum effectiveness. Since wear in the bearing is practically eliminated and the rollers are permanently held in the position considered best by roller-bearing manufacturers, the reliability of this unit is expected to be unsurpassed.

Features of improved design include the low stress in the axle, axle housing and wheel, and the improved service possible from roller bearings. The axle, while nominally stationary, gradually creeps in service in the direction opposite to the rotation of the wheels thereby continually changing the load-carrying position of the cone or inner race. Wear on the roller cage is almost entirely eliminated because centrifugal force holds the rollers against the outer housing which rotates around the axle and in effect carries the rollers along.

Effective Lubrication System

The life of the bearings is also increased by the effective lubrication system. When the unit is not revolving, the lubricant flows down by gravity and immerses the lower part of each bearing, where it is needed when the car starts to move. When the car is running, centrifugal force holds the lubricant in the larger diameters of the housing. This prevents the loss of lubricant and keeps it in contact with the roller surfaces.

There is less friction than in journal-box installations because there are fewer parts. The rigid axle housing between wheels carries all thrust loads in one direction to one side so only a single set of rollers is necessary in each wheel. The lateral thrust is equally distributed over all rollers in the bearing on one side of the car and that bearing is partially relieved of the weight of the car. This eliminates the danger of high momentary concentration of loads on the rollers.

Exhaustive tests have been made on A.S.F. roller-bearing units. One rack has been in continuous use for almost two years in an endurance test on two types of bearings. This rack was operated at a constant speed of 60 m.p.h. and a load 20 percent greater than the A.R.A. axle capacity. This test was still continuing when the units had withstood the equivalent of 650,000 miles of service.

The test racks have been operated without a stop for 50,000 miles at constant speed of 60 m.p.h. with the axles loaded 20 percent in excess of A.R.A. ratings and without the addition of lubricant or attention of any kind. Other tests have been made at constant speeds of 60 miles per hour with loads increasing after each 5,000 miles up to 100 percent in excess of A.R.A. capacity.

Twenty-four hour non-stop tests have been made using lateral thrust conditions which destroyed the lateral thrust bearing surface on friction journal brasses in ten minutes.

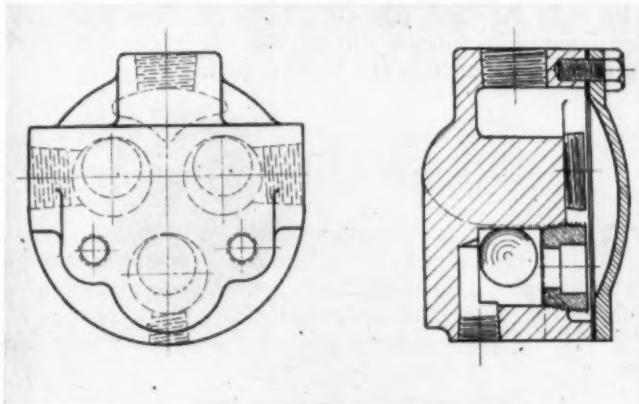
In addition to test-rack demonstrations the units have been placed in actual service under widely varying conditions and are proving their ability to perform satisfactorily.

In even the most severe conditions, they have proved satisfactory on trailer trucks where the severe lateral thrust encountered have, heretofore, made successful bearing operation a considerable problem.

The units operate constantly with a very small temperature rise; and they are many times more reliable than frictional bearings, since no special inspection nor attention to lubrication is required between the usual shoppings of the equipment.

Automatic Drain Valve for Compound Air Compressors

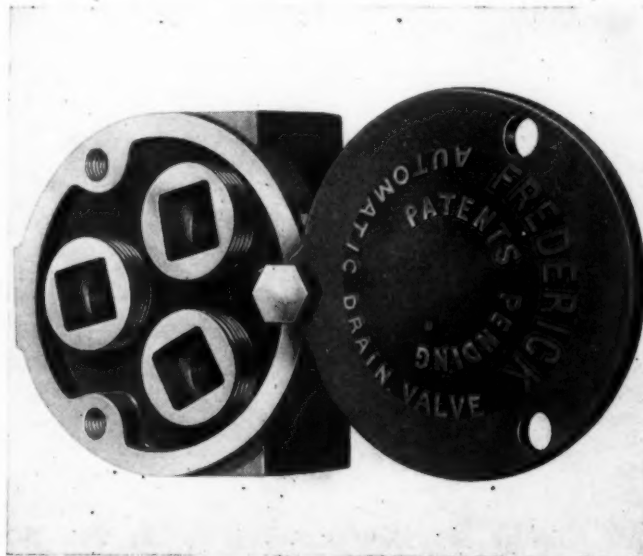
THE Frederick Iron & Steel Company, Frederick, Md., is manufacturing an automatic drain valve for the steam end of cross-compound air compressors. It can be applied to any convenient place beneath the lowest connection by a small bracket held by a nut on the air-compressor head. The two 1/2-in. pet cocks are removed from the lower end of the steam cyl-



Sectional View of the Drain Valve

inders and the 1/4-in. pet cock is removed from under the main steam-inlet boss. The two 1/4-in. pipe taps on each side of the drain valve are connected to the lower end of the steam cylinders and the 1/4-in. pipe tap on the top of the drain valve is connected to the main steam-inlet boss. A 1/2-in. pipe is run from the bottom of the drain valve to any convenient point for drainage.

The operation of the valve is effected by a ball valve as shown in the sectional illustration. The upper port



Frederick Automatic Air-Compressor Drain Valve

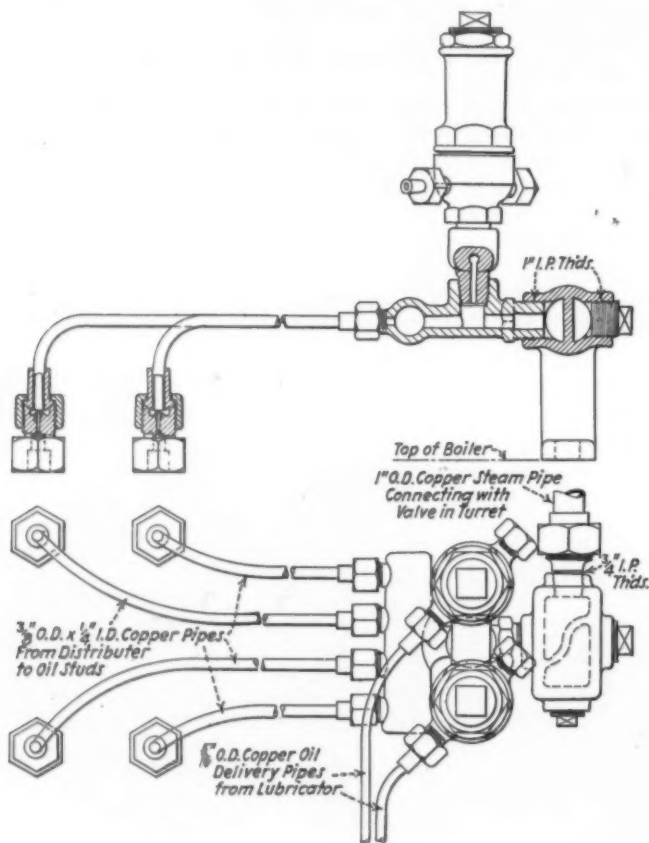
and the two side ports shown in the right view, are connected to the drains of the air compressor. The port at the top, which is a 1/4-in. pipe tap, is connected to the pocket under the main steam connection. The two side ports, which are tapped for 1/2-in. pipe, are connected to the bottom of the high- and low-pressure steam cylinders. The lower 1/2-in. pipe tap is to drain the condensation to any convenient place under the locomotive.

When the air pressure in the main reservoir is reduced below a determined point, the governor opens and the air pump starts. There is a certain amount of condensation in the governor and in the steam lines which is caught in a pocket just below the main steam connection.

The same applies to the inside of the high- and low-pressure cylinders; condensation forming in the bottom is drained to the valve when the governor opens and the pump starts, the pressure on the balls seat them on the bushing, closing the steam lines of the pump, and when the air pressure is built up to a determined point the governor stops the air pump. With no pressure in the steam cylinders, there is no pressure back of the balls. The balls then fall from the valve seat and what condensation was formed during the operation is drained automatically through the bottom port.

Nathan Oil Atomizer

THE Nathan Manufacturing Company, New York, has designed an oil atomizer intended for use with its locomotive valve and cylinder mechanical lubricator. The purpose of the device is to improve the functioning of the lubricator by assisting in the distribu-



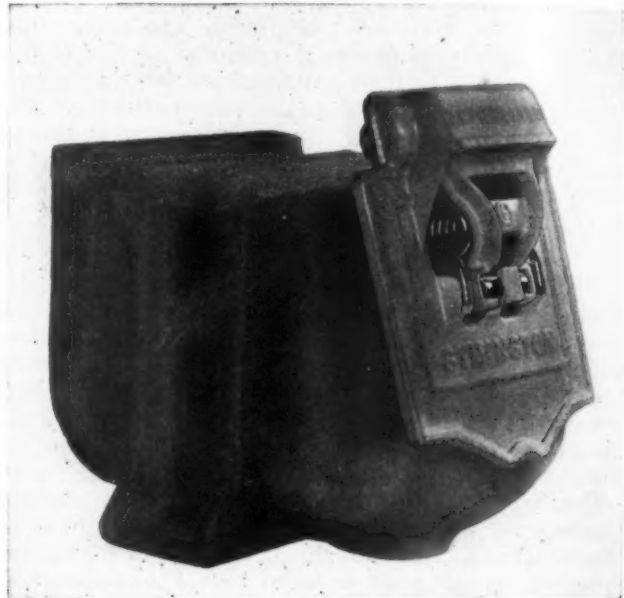
Oil Atomizer and Stand Arranged to Split Two D-X

tion of oil to the cylinder and valve surfaces when the locomotive is drifting or working with high superheat.

The atomizer is connected to a 1-in. O.D. copper steam pipe leading back to a valve in the turret and is supplied with oil from two feeds of the mechanical lubricator. The steam atomizes this oil and distributes it through four outlets, which are connected to choke plugs mounted in the valve and cylinder oil studs of the locomotive.

Symington Articulated Lid for Journal Boxes

THE Symington Company, Rochester, N. Y., has developed a design of articulated or self-adjusting journal-box lid in which the lid proper is a malleable casting provided with an integral hinge-lug housing to prevent the accumulation of dirt or water along the top of the lid and box joint surface. The side and



Symington Articulated Journal-Box Lid

top lips or flanges and the interior oil drip, required by the American Railway Association, are also incorporated in the design.

The lid hinge-pin does not pass through the lid proper, which feature permits the necessary articulation or self-adjustability in all directions so that the lid will



Position of the Pin and Block of Wood When Applying the Pin

always remain in uniform contact with the face of the box, regardless of the normal variations in the location of the hinge lug with reference to the box face. The hinge pin is a plain piece of $\frac{3}{4}$ -in. round steel bar, having neither head nor point, and requiring no auxil-

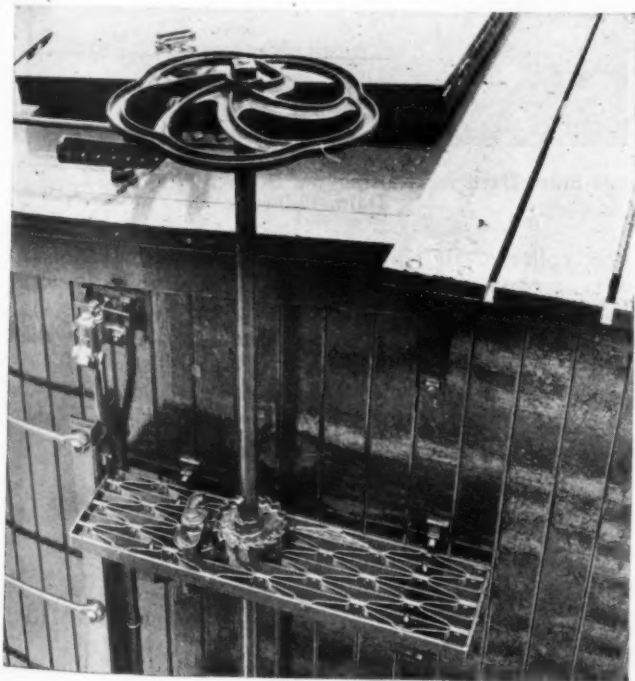
iary retaining means or riveting to hold it in position. This pin passes through the upper loops of a separate casting known as a spring spider, and this spider is pivoted to the lid proper at approximately its central point. The operating spring is the same double-coiled torsion spring which has been standard with this company for many years.

In the process of assembly of the lid, a small block or wedge of wood is driven between the housing and the spring spider. To apply the lid to either an integral or separate box, the lid is simply laid on the top of the hinge lug and the lid pin slipped into position. The lid is then partially closed until the spring wear shoe rests upon the highest point of the hinge-lug cam. When in this position, the small block of wood may easily be removed, after which the lid is closed to service position. To remove the lid from the box, it is merely necessary to reverse the procedure, opening the lid sufficiently to permit driving in a small block of wood or other convenient object, then raising the lid to permit the removal of the pin.

Accidental removal of the lid pin is impossible as the sides of the lid housing extend at each end over one-half the diameter of the pin.

Irving Safkar Brake Step

THE Irving Iron Works Company, Long Island City, N. Y., has developed two new applications for its Safkar running boards and steps, one of which is shown in the illustration. This step, which is of open-metal construction, built up of steel bars in two different depths, placed on edge and riveted solidly to-

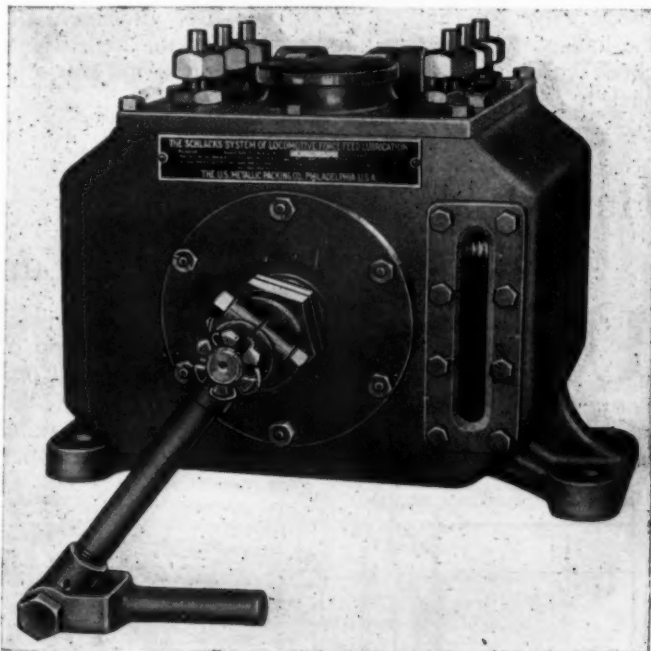


The Safkar Step Applied to a Box Car

gether, with all edges flush on the top face, was described in the June 9, 1926, *Daily Railway Age*. In addition to the brake step application, Safkar running boards and steps have also been developed for locomotives. A recent application was on the Northern Pacific 2-8-8-4 type locomotive, a description of which was published in the *Railway Age*, December 29, 1928, page 1295.

Schlacks RS-6 Model Mechanical Lubricator

THE United States Metallic Packing Company, 429 North Thirteenth street, Philadelphia, Pa., has made a number of changes to its Schlacks Model R S-5 mechanical lubricator and has introduced a new model, RS-6. The difference between the two models is in the lubricator reservoir, the RS-6 being larger than the RS-5. This change was made to provide for the use of a sight glass in one piece. The RS-6 reservoir has also been equipped with feet for bolting instead of the through bolts used with the RS-5 model.



The Model RS-6 Mechanical Lubricator—Capacity 22 Pints

The change in model number provides for the change in the reservoir. Other than these differences, the two models are exactly alike, and the following description will apply to either model, which may be equipped with any number of pumps up to and including six.

The pump units are attached to the cover of the lubricator reservoir, and are kept in correct relation to the cam shaft by a dowel in the pump body which engages in a hole in the cover of the reservoir. The pump bodies are of government bronze and the pump plungers are of hardened tool steel, ground to an exact fit. With this combination of metals, a minimum of wear of plunger and pump body is assured.

The cam shaft is driven by pawls engaging with a ratchet disc. The driving pawls are located in the driving shaft unit, and this unit is actuated by the motion work of the locomotive. The cam shaft and cams are rotated whenever the locomotive is in motion, revolving the cam shaft and cams in a clockwise direction. This movement and the shape of the cam causes the plunger of the pump to deliver oil through almost the complete revolution of the cam; a small time interval being occupied by the plunger returning to draw oil into the pump. This action is practically instantaneous and the pump almost immediately starts forcing the oil beyond the upper ball checks, and so on through the terminal check valve to the point to be lubricated.

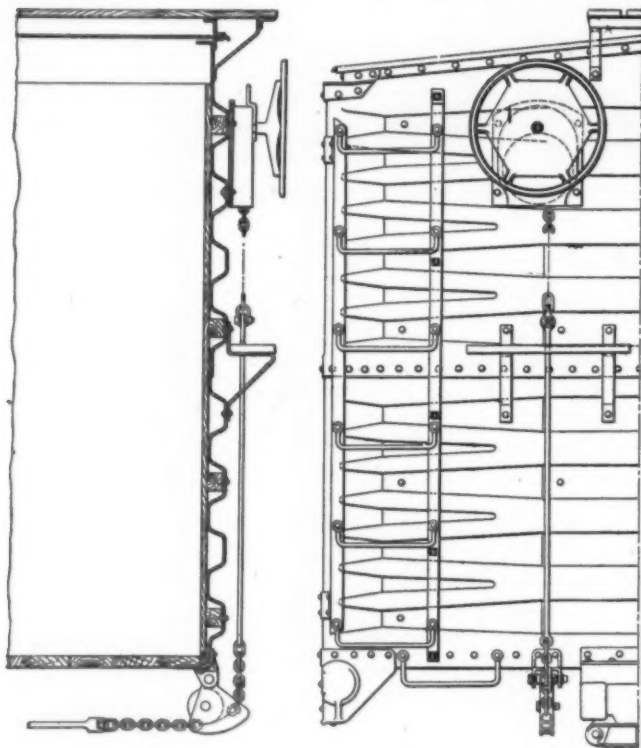
The amount of oil that either of these lubricators

will deliver is governed by the length of the lever arm. By lengthening this arm, less oil is delivered, and by shortening it, more oil is delivered. If it is desired to deliver a greater percentage of the oil to one point than to another, a cam with a greater or smaller throw is used on the cam shaft in place of the standard cam, which has a 3/16-in. throw. Cams are furnished with 1/8-in., 3/16-in., or 1/4-in. throw. This permanent adjustment of feeds prevents unauthorized persons from regulating the amount of oil to be delivered, thereby maintaining official control of the oil consumption. To inspect the pumps it is necessary only to remove the cover with the pumps attached, from the reservoir.

The Schlacks diaphragm terminal check valve is an important part of this system of lubrication, as it maintains a constant oil-pipe pressure at all times up to the check valve, so that on almost the first movement of the locomotive, positive lubrication is established. This check valve also prevents condensation from working back to the lubricator reservoir.

Hand-Brake Wheel Below Top of Car

UNDER certain conditions, it is desirable to place the wheel of the hand brake below the top of the car. The Union Railway Equipment Company, Chicago, has designed such a hand brake, the wheel of which is placed in a vertical position parallel to the side of the car. The device consists of an upper



Ureco Hand Brake Applied to the Side of a Box Car

unit made of a pressed steel housing, a brake wheel and a gear and pinion. The lower unit consists of a bracket attached to the end sill, a bell-crank and a sheave wheel. This unit functions the same as the ordinary bell-crank used with other brakes of this type, but in addition, it is arranged never to "go dead."

When the bell-crank reaches the limit of its travel, the chain disengages from the bell-crank proper and travels over the sheave wheel. Thus, the bell-crank does not require that the chains, rod, etc., be finely adjusted since it has unlimited chain travel and also that the upper unit has a capacity for greater travel than will be required with maximum wear on the lever, pins and brake shoes.

Shimming Device for a Two-Level Dalman Truck

THE illustration shows a shimming device designed by the Standard Car Truck Company, Chicago, for use with the Barber lateral motion device in order to raise the height of the truck bolster of the two-level Dalman truck when the drawbar has become too low.

With the lateral-motion device, the truck bolsters are provided with the contours for receiving the lateral mo-



Shim Used for Raising the Bolster of a Two-Level Dalman Truck

tion rollers. In shimming up, this roller cap makes a new contour on the bolster for the rollers and the back of the shim fits the old contours in the bolster.

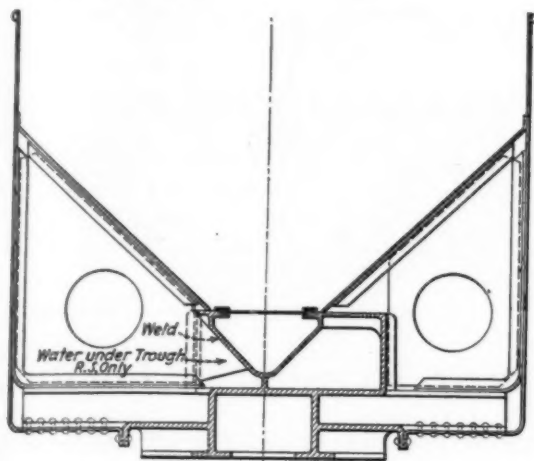
The shim is of drop-forged steel and forms a roller cap that slips into place and is securely held for displacement, the one piece taking the place of four pieces required in other methods of shimming. The shims can be furnished in different thicknesses.

Hicken Tender Design Increases Water Space

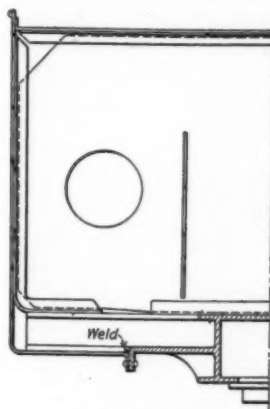
THE Baldwin Locomotive Works, Philadelphia, Pa., has patents pending on the Hicken design of locomotive tender, the purpose of which is to increase water capacity. The illustration shows the stoker compartment and stoker conveyor trough for the Standard stoker cast integral with the tender frame. The built-up center sill is replaced with a cast center sill with seven arms extending out from each side of the sill. As shown in Section C-D, the outer side sheets of the tender extend around the lower edge of the tender to the center-sill arms, to which the sheets are riveted and

welded together. This design eliminates the use of side sills and also reduces the number of seams through which water may leak.

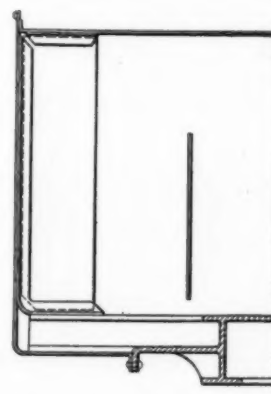
The advantages claimed for this design of tender are the elimination of rivets in the stoker compartment and the addition of about 600 gal. to water capacity.



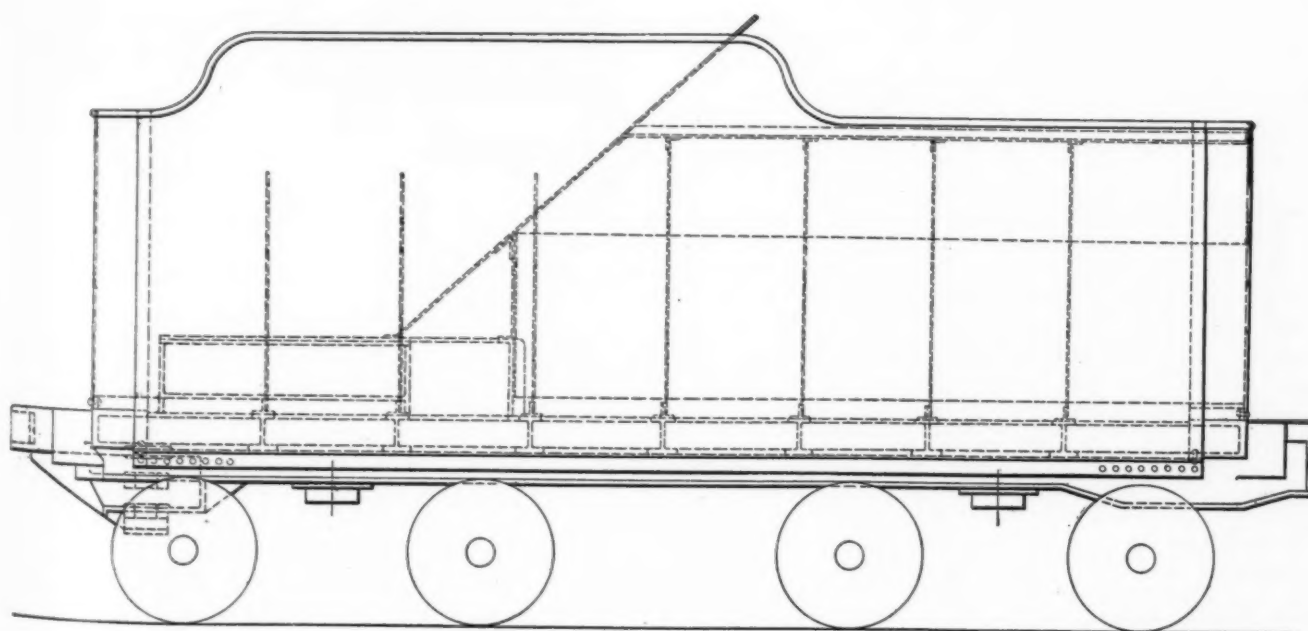
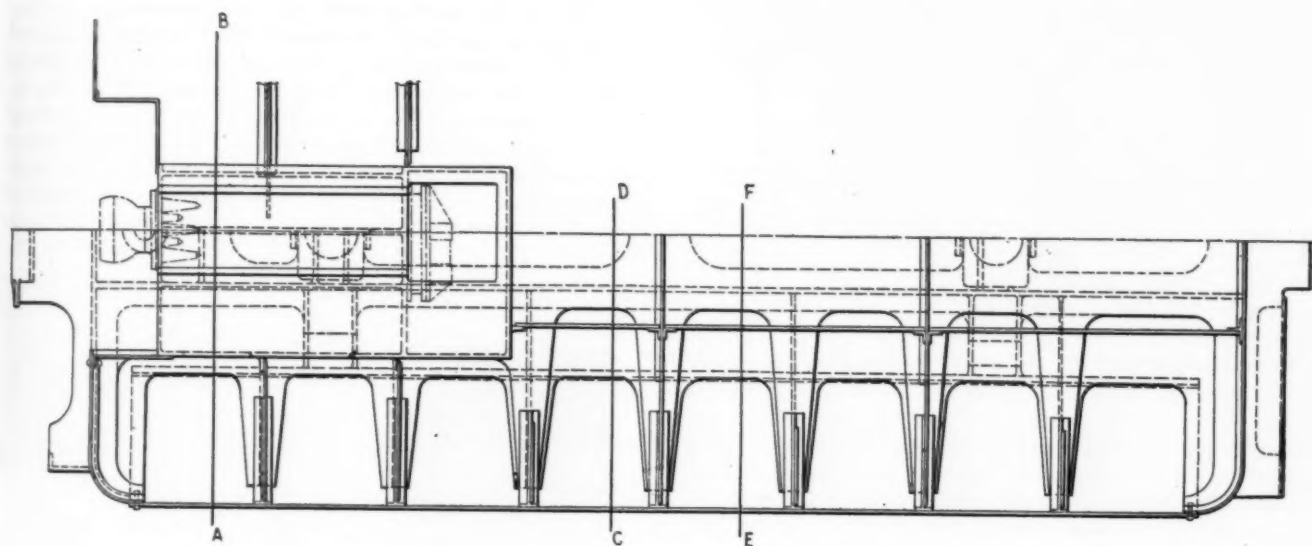
Section "A-B"



Section "C-D"



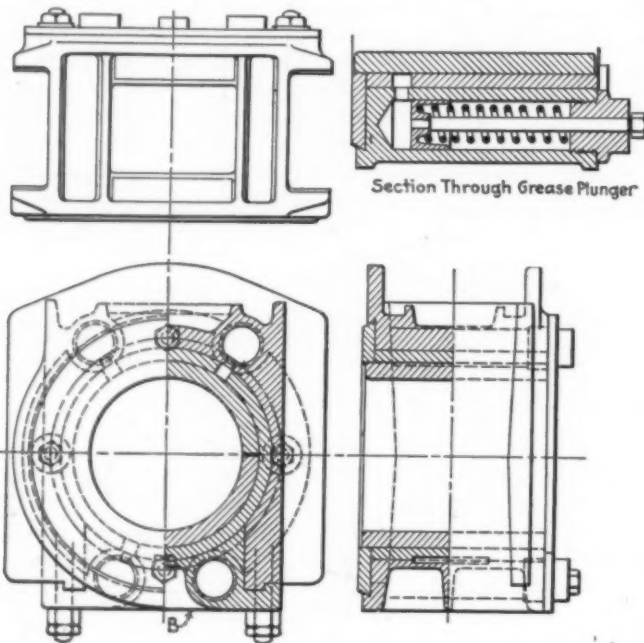
Section "E-F"



General Arrangement of the Hicken Tender

Floating-Bushing Driving Box Changed

A CHANGE in construction has been made by the Locomotive Finished Material Company, Atchison, Kansas, in the Universal floating-bushing driving box since it was described in these pages. The box is now made with the jaws extending the full depth



General Arrangement of the Universal Floating-Bushing Driving Box

of the box. The space at the bottom of the jaws is filled in with a binder designated as *B* in the illustration. The binder takes the place of the cellar used on an ordinary crown-brass type of box, but it does not extend to the center line of the box as is common with the grease cellar.

Insulation for Refrigerator Cars and Cold Storages

THE Union Fibre Company, Winona, Minn., is now marketing an improved composition of insulating material, known as Lith. This insulation is manufactured in board sizes 18 in. wide by 48 in. long and 2 in. thick. Thicknesses of 1 in., 1½ in. and 3 in. can also be purchased in quantity lots. Lith is applied like lumber and is said to have a tensile strength comparable with that of the wood ordinarily used in sheathing buildings. It is made of rock wool, and flax fibre which is cooked in a chemical solution and steamed to remove all gums, oils and other impurities. Rock wool, of which Lith is largely composed, is made of limestone fibre, which is fireproof. All Lith boards are cut to the standard size, which contains 6 sq. ft. The 1-in. board has a weight per square foot of 1.25 lb.; the 1½-in. board, 1.88 lb.; the 2-in. board 2.50 lb., and the 3-in. board, 3.75 lb. The approximate thicknesses generally used to maintain given temperatures with normal re-

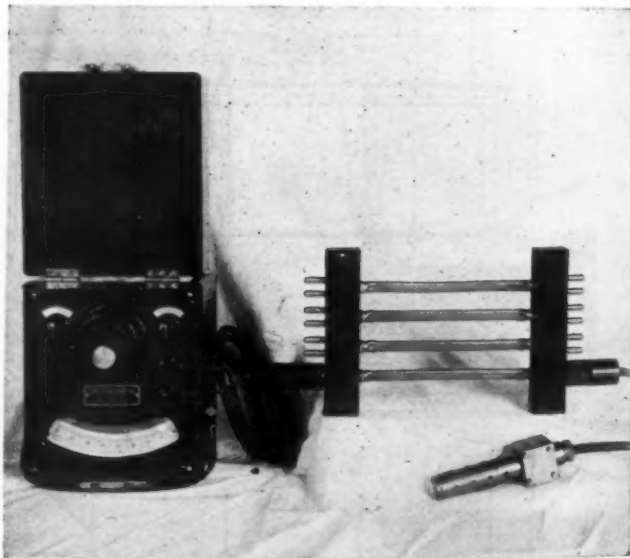
frigeration and average outside temperature conditions, are as follows:

For temperature, deg. F.	Thickness inches
Minus 15 to 5	6 to 8
5 to 20	5 to 6
20 to 35	4 to 5
35 to 45	3 to 4
45	2 to 3

Lith is manufactured for application to refrigerator cars and cold-storage buildings, such as packing houses, ice factories and storage houses, meat coolers, fish freezers, hog coolers, and fruit and produce storage buildings. The Union Fibre Company has also recently announced a line of Lith lagging cut in strips and in segment form for insulating curved surfaces.

Electric Resistance Thermometer for Refrigerator Cars

A DEVICE for ascertaining and recording the inside temperature of a refrigerator car from the time of its loading until the car arrives at its final destination has been developed by Charles Engelhard, Inc., 90 Chestnut street, Newark, N. J. This device, which is known as the Engelhard electric resistance recording thermometer, is designed to provide the railroad with a temperature record, which can be used as evidence in cases of damage claims on shipments of fruits, vegetables, etc. Ordinarily, the railroads have no means of proving whether or not a car of fruit or vegetables was



The Engelhard Electric Resistance Recording Thermometer

in bad condition when it was loaded, or whether the inside temperature of the car was not properly maintained during the trip. With a record, however, such as that provided by the recording thermometer, the railroad can show whether or not the inside temperature of the car was properly maintained and if it was, the fruits arriving in poor condition must not have been sound when first loaded in the car.

The Engelhard recording thermometer is also recommended for use in the adjusting or regulating of the inside temperatures of refrigerator cars for meat shipments. It is necessary, when shipping meat, to maintain a sufficiently low temperature so that there will be no

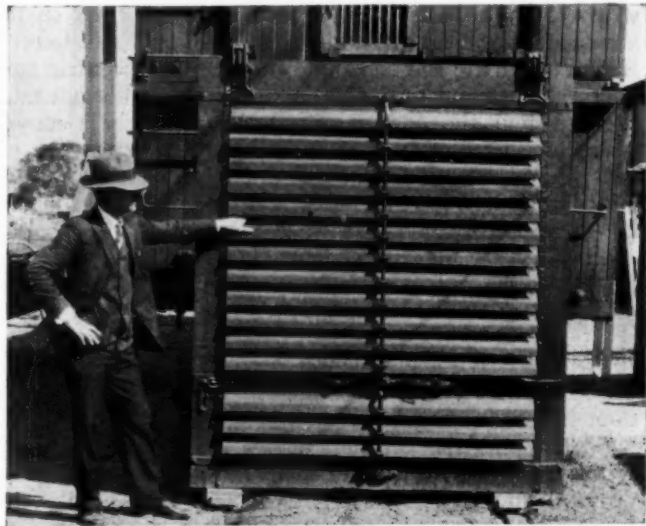
loss of moisture with the resultant decrease in the weight of the meat.

The thermometer is also used for checking temperatures in cases where refrigerator cars, loaded with frozen products, are mixed in the same train with cars containing field-warm fruits.

This recording thermometer is a direct-deflection instrument. The actual measuring element of the device is a small spiral of high-resistance platinum wire wound on fused quartz tubes, 3 m.m. in diameter and usually 6 c.m. long. These spirals are enclosed in outer quartz tubes, which are hermetically sealed by fusion. This quartz mounting provides high electrical insulation and at the same time, preserves excellent heat conduction. The electrical resistance of the thermometer spiral varies in proportion to its temperature. By measuring the electrical resistance of the thermometer spiral, the corresponding temperature can be found. This is the basic principle on which the Engelhard recording thermometer is designed in order to obtain temperature measurements. The instrument measures the electrical resistance but calibrates it directly in temperatures rather than in terms of corresponding electrical resistance. The same indicating and recording instruments that are used with thermo-electric pyrometers, electric gas analyzers, etc., are used for this purpose. The connections used are similar to those of a Wheatstone bridge, except that no manual adjustment is required. The indicators and recorders are made to read temperatures directly, and scales can be furnished which cover the exact working range. The thermometers can also be furnished to operate with any one of three different scales, and they can be calibrated between any combination of temperatures desired.

foreman, car department, of the Seaboard Air Line, Jacksonville, Fla., has patents pending on a combination ventilator and solid-bottom car door.

The structure consists of two door stiles made of $\frac{1}{8}$ -in. by 5-in. by 7-ft. 4-in. sheet steel. On the inner edge of each stile, next to the ends of the louvres, is a water channel in the form of a Z-bar. The back side of the door is made to fit inside of an angle iron which is applied to the car to form a weather strip. When the louvres are in a closed position, each one overlaps the other one inch throughout the door and the ends of each



A Door with the Louvres Open

Combination Ventilator and Solid-Bottom Car Door

ALL Southern roads at the present time are using two sets of doors on box cars, one set for ventilating cars when loaded with perishable goods and a second set of solid doors when the cars are loaded with general merchandise. To eliminate the necessity of using two sets of doors, M. F. Fitzpatrick, general

louvre neatly fit into the door stile and lie on top of the water channel, which has an edge flanged outward to prevent the water from going inside of the car. Thus, any water that may escape over the ends of the louvres flows down the drain channel to the bottom of the door.

The top mullion is made of $\frac{1}{8}$ -in. by 8-in. by 6-ft. 2-in. sheet steel, stiffened with an angle and made to fit all door hangers except Jones hangers. It also carries a support for the eccentric rod. The bottom mullion is made of $\frac{1}{8}$ -in. by 7 $\frac{1}{4}$ -in. by 6-ft. 2-in. sheet metal, also stiffened with an angle and offset at the top to allow the bottom louvre to extend over it and make a



Seaboard Car Equipped with the Combination Ventilator and Solid-Bottom Car Doors—
The Louvres are in the Closed Position

water-tight joint. The bottom mullion also carries an eccentric-rod support.

An intermediate mullion, so called, is located between the third and fourth louvres from the bottom. It is offset at the top so that the fourth louver in the closed position will fit into it to form a water-tight joint. A piece of sheet steel, $\frac{1}{8}$ in. by 3 in. by 6 ft. 2 in., is bolted across the intermediate mullion; it serves to brace the door stiles and also carries two sealing devices, the throw-lever bar, an eccentric-rod support and the hasp.

The eccentric rod is $\frac{3}{8}$ in. in diameter, 6 ft. 8 in. long and has three offsets, one at each end and one which works on the hasp bar. This rod is attached to the louvres with U-hasps, and pins, one on each louver. Each end of the rod is free to move in an eccentric support one fastened to the top and one to the bottom mullion. When the eccentric rod throw lever is moved horizontally from one side to the other, it causes the eccentric rod to open or close the louvres. The throw lever is fastened to the eccentric rod with lugs and a connecting pin which form an eccentric.

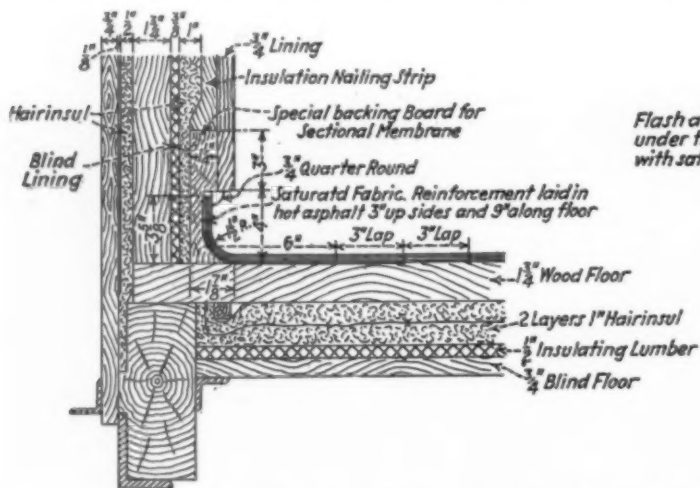
The dimensions of the louvres are $\frac{1}{8}$ -in. by 6-in. by 5-ft. 4-in. sheet steel made in the form of a double offset or modified Z with pivots on the ends, about which they rotate. The door contains 15 louvres with openings 2 in. wide by 64 in. long between them, which provide an air space of 16 sq. ft. per door. Practically the entire door height is ventilated.

The application of these doors eliminates two doors with their fixtures from each car. By applying the doors to the car shown in the illustration, a total saving of \$89 was effected and the weight of the car was reduced by 507 lb.

Waterproofing Flooring of Refrigerator Cars

AN investigation of the question of the proper refrigeration of food stuffs in transit has shown that for certain commodities the proper condition for safe carriage to the market can only be obtained by the use of ice in the body of the car.

The water from the melting ice slowly penetrates



Left—Typical Section Through the Side Wall and Floor; Right—Detail at the Door Opening

through the flooring of the car and saturates the insulation, the sills and the underframe. This condition of continued saturation has a serious effect upon the effi-

ciency of the insulation and also causes deterioration of the car floor. In addition, this wet condition of the floor and the wood underframe makes a favorable medium for the growth of wood-rotting fungi.

To overcome this condition the Johns-Manville Corporation, 292 Madison avenue, New York, has developed its Type K sectional waterproof floor for refrigerator cars. It is a membrane type of waterproofing, laid in parts of three different shapes. Part A is laid along the side walls at the doors; Part B forms the cove base at the walls, and Part C is laid on the main body of the car.

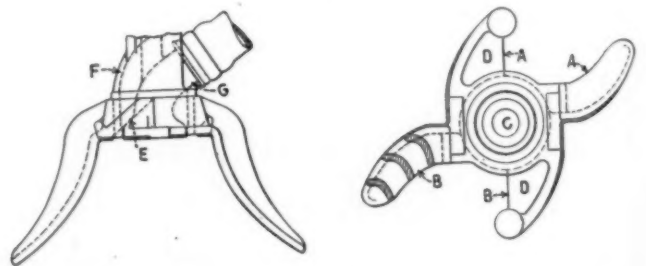
All of these different pieces are shipped cut to the proper size as determined by the drawings of the car, which simplifies the installation.

The Type K sectional waterproof floor can be used on old equipment and, of course, is adaptable to new equipment, especially when floor racks are used. A damaged sheet can be removed and replaced at a low cost.

Heads of the Robinson Automatic Connector

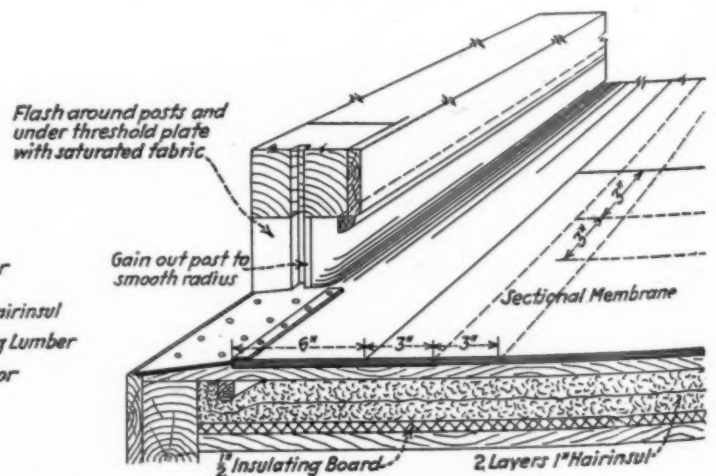
THE Robinson Connector Company, New York, has redesigned its freight-car connector head to provide ample protection of the joint between the heads from the effects of an accumulation of snow or ice.

Referring to the illustration, the redesign involved in



Two Views of the Robinson Connector Redesigned to Prevent the Accumulation of Snow or Ice on the Heads

cutting away, as at A and B, half of the width of each wing and half of that part of the head which lies above



and below the air port C, and in turning the remaining wall or face D to the rear, as indicated by the dotted lines at E. With this arrangement and distribution of

the metal in the head, the surface *D* faces the openings *A* and *B* when the heads are coupled, thus providing a wide and easy exit for any snow or ice that may accumulate on the head. The design permits the freight head to be of a size best suited for freight service and yet interchange with the passenger head, which is made to a size best suited for passenger service. A saving in metal of approximately 8 lb. per freight head, or a saving of 16 lb. per car set is gained. The redesigned head is interchangeable with the previous design of head.

The illustration also shows the head mounted on the customary Robinson connector pipe or carrier *F*, with the connector hose fitting *G* removably mounted in the carrier.

Crane Valves for Railroad Service

THE Crane Company, Chicago, is now manufacturing two lines of valves for use on locomotives, both of which can be used with 300-lb. steam pressure at a temperature not exceeding 600 deg. F. One line, which is shown in Fig. 1, includes brass globe, angle and locomotive valves fitted with renewable Cranite discs and union bonnets. All the parts except the bodies, are interchangeable on this new line of valves.

The design includes the practical and serviceable union bonnet construction, a feature that is especially valuable for valves used under severe service conditions where frequent regrinding and replacement of parts is necessary.

with screwed ends and union bonnets. Valves of this type are unusually rugged in construction and are suitable for all railroad and general service requirements. All of the parts of these valves are interchangeable, except the bodies.

The union bonnet construction is especially desirable for valves used under severe service conditions where

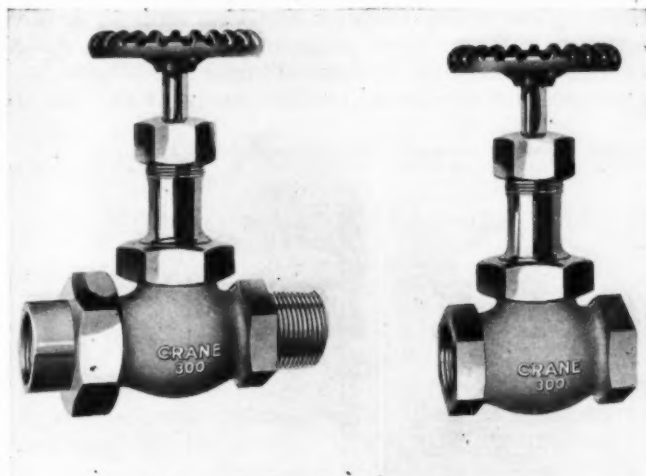


Fig. 2—Left: Hard Metal Locomotive Globe Valve—Right: A 300-Lb. Hard Metal Globe Valve

regrinding and replacement of parts must be done quickly. Stems, packing nuts, bonnets and union bonnet rings are made of forged brass. The body and disc are cast of Crane hard metal. Discs are of the swivel type. The malleable-iron non-heat handwheel is held

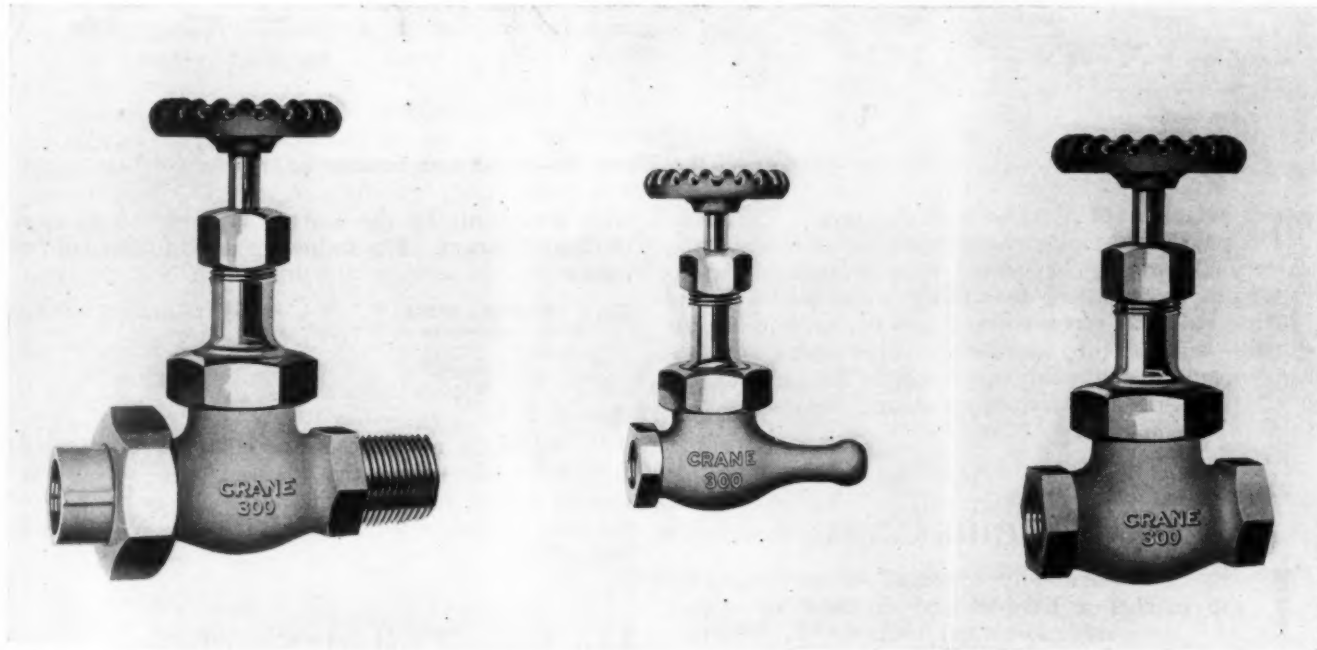


Fig. 1—Left: Locomotive Brass Globe Valve—Center: Brass Cab-Hose Valve—Right: A 300-Lb. Brass Globe Valve

The stem, packing nut, bonnet, union bonnet ring and disc holder are made of forged brass in order to provide a metal that will withstand rough treatment. A brass wheel nut holds the malleable-iron, non-heat handwheel tightly in place. A deep stuffing box fitted with a brass gland permits the valve to be repacked while in the line and under pressure.

The second line, which is shown in Fig. 2, includes hard-metal globe, angle, check and locomotive valves,

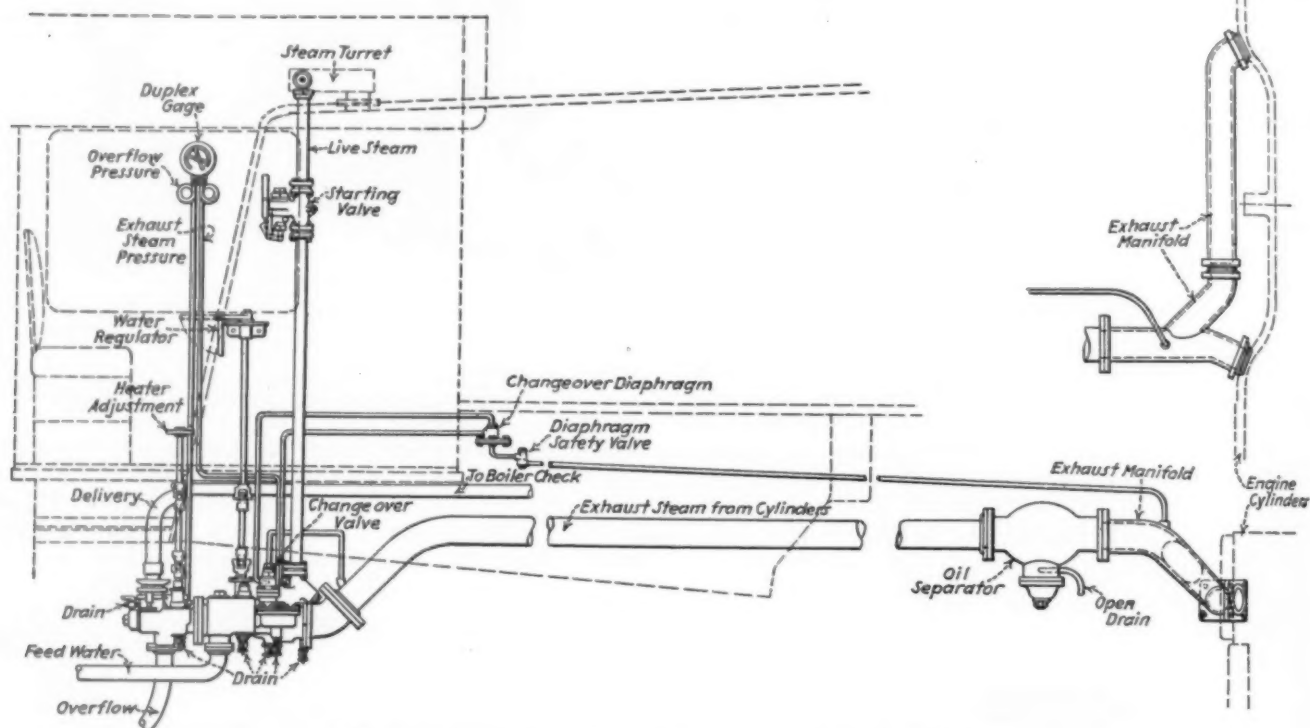
tightly to the stem by a brass wheel nut.

All valves are equipped with deep stuffing boxes and are fitted with brass glands. They can be repacked when wide open and under pressure.

The check valves are made similar to the globe valves and are equipped with dashpots in the upper part of the body. The cap and disc construction permits the insertion of a spring to keep the valve normally in the closed position.

Pipe Arrangement for Exhaust-Steam Injector

PREVIOUSLY, the exhaust-steam injectors manufactured by the Superheater Company, New York, were arranged for changeover from exhaust to live steam operation and vice versa by a valve actuated by steam-chest pressure. The present design of valve is actuated by exhaust steam at cylinder back pressure with the result that the starting valve and the



Piping Arrangement of the Elesco Exhaust-Steam Injector

piping arrangement has also been changed.

The redesigned piping arrangement includes a starting valve in the cab, a changeover valve located on the injector proper and a single steam pipe from the turret and starting valve to furnish live steam to the injector for standing and drifting operations. This piping arrangement results in minimum equipment in the cab and low installation and maintenance costs, and the operation is said to be simplified.

Cab-Curtain Canvas

THE Lehon Company, Chicago, recently placed on the market a hard-twisted double-filled cotton duck thoroughly saturated with asphalt. The material does not lose the property of pliability when it undergoes saturation. The saturation greatly increases strength of the fabric and its resistance to puncture. It also increases the fire resistance of the material. If the cab curtain becomes ignited it will not continue to burn unless it is held in contact with a flame or with red-hot metal.

In color the Mule-Hide cab-curtain canvas is brownish black. It is impervious to water and is not affected by locomotive gases, electrolysis or any other agency of deterioration which shortens the life of a cab curtain.

The M-F Speed Lock Nut

THE MacLean-Fogg Lock Nut Company, Chicago, has placed on the market a lock nut for use on sheathing and roof bolts of freight cars as well as on all other bolted parts of cars. It is a square or hexagonal nut, in the top of which is a deep groove; the bottom of the nut is concave. The nut is locked to the bolt by the act of wrenching it home. No second nut is required.

On December 12, 1928, a stripping test was made

with these nuts by the Robert W. Hunt & Company, testing engineers. The following is a summary of these tests:

Size of bolts fitted with M-F Speed Lock nuts, in.	Loads at which bolts broke, lb.
$\frac{3}{8}$	4,700
$\frac{7}{16}$	8,230
$\frac{1}{2}$	13,280
$\frac{5}{8}$	20,110
$\frac{3}{4}$	25,370

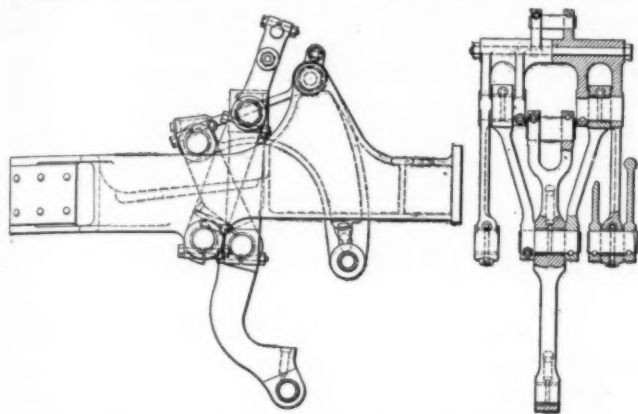
On all of the above tests, the bolts broke through the bottom of one of the threads and there was no fracture or failure in any of the nuts. At the present time the nuts are made for all bolts, sizes $\frac{7}{8}$ in. in diameter and smaller.

Hollow-Rolled Staybolt Iron in Sizes $\frac{7}{8}$ to $1\frac{1}{4}$ in.

THE Burden Iron Company, Troy, N. Y., has placed on the market a hollow-rolled staybolt iron which has the same physical characteristics of the cold staybolt iron made by this company. It can be furnished in all staybolt sizes, $\frac{7}{8}$ in. to $1\frac{1}{4}$ in. round, inclusive, and in lengths up to 14 ft. or longer, if necessary. It can also be furnished in blanks, headed and machine-cut to exact lengths.

Recent Changes Made in Baker Valve Gear

THE illustrations show two major changes made in the Baker valve gear, manufactured by the Piliod Company, 30 Church street, New York. One of the illustrations shows the general assembly of a Baker valve gear, on which is used a redesigned type of double-arm reverse yoke. The purpose of this de-



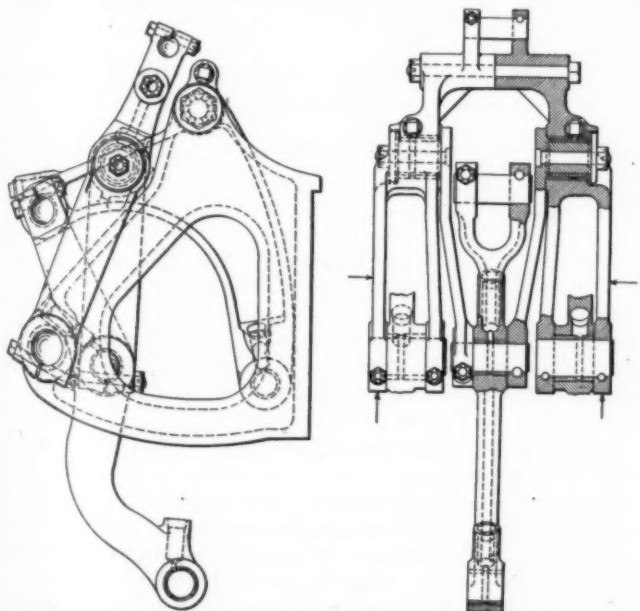
General View of the New Design of the Double-Arm Reverse Yoke Used on the Baker Valve Gear

sign is to eliminate the trunnion at the lower end of the vertical member.

When this part is made of either a casting or a forging there occurs at times a cold shut or porosity at the junction of the trunnion and vertical member which is not discernible in many cases, even after machining, but in subsequent hard usage will sometimes develop a progressive fracture, resulting in ultimate failure of the member.

The double-arm yoke is designed to get away from this entirely, having interchangeability with the present gear parts in view so as to necessitate no further change of other parts. It can be applied to all existing Baker valve gears.

The new type of center-hung valve gear which is illustrated goes a step further in that it eliminates all



The Center-Hung Baker Valve Gear—All Trunnions Have Been Eliminated in the Reverse Yoke and Radius Bar

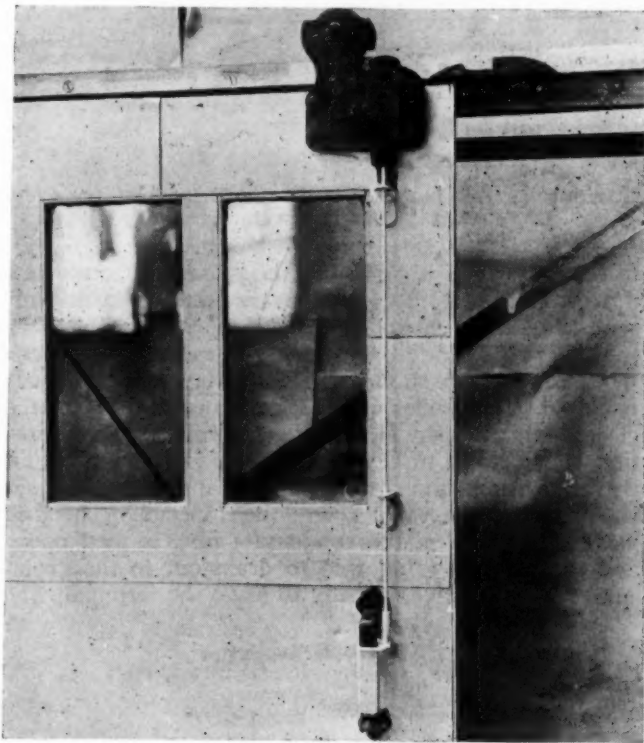
trunnions, both in the radius bars and the reverse yokes. The reverse yoke is a straight member supported in double-shear bearings directly supported within the gear frame and is provided at the top with a similar arrangement in which are hung the radius bars. In both cases it will be observed that the straight pins support these parts in double shear, which is intended to add considerably to the ruggedness of the gear and to retard the development of lateral lost motion.

The existing principles of the Baker valve gear have in no wise been disturbed.

Releasing Device for Baggage-Car Door Hanger

THE Midland Company, South Milwaukee, Wis., has added a releasing device to its baggage-car door hanger described on page 1490D91 in the June 25, Daily issue of the *Railway Age*. The purpose of the device is to enable the baggageman to release the safety lock, using the same hand that he uses to open and close the door, instead of having to use two hands.

The device consists of a sheath enclosing the handle loosely, so that it can slide up and down. In this sheath



Combination Baggage-Car Door Hanger and Safety-Stop Release

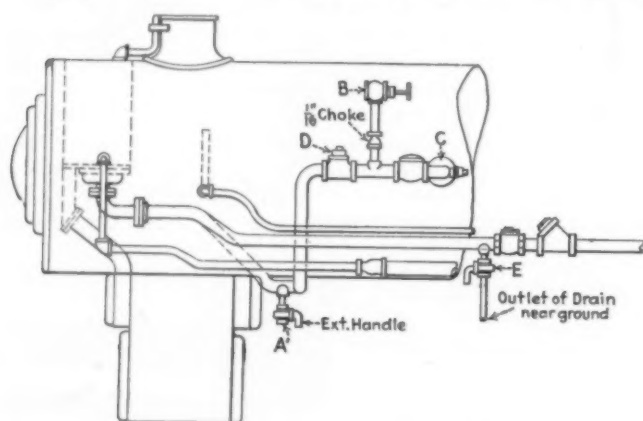
is placed a rod which extends to and enters a hole in the bottom of the locking bolt in the hanger. It is held rigidly by two angle clips properly spaced between the handle and the hanger. The operator can open the door freely without the lock engaging, but when he closes the door, the safety stop of the door hanger will operate as heretofore, stopping the door 14 in. from the jam.

To release the locking bolt, the operator with the hand which is already grasping the handle, releases the bolt by pushing upward on the sheath, thus lifting the bolt from the slot in the safety stop attached to the track. He can then pull the door closed.

The safety stop feature is not impaired, because it requires an effort for the operator to lift the bolt and there will be no tendency to exert this effort until it is necessary; that is, after the bolt has dropped into the slot.

Removal of Scale from Coffin Feedwater Heater

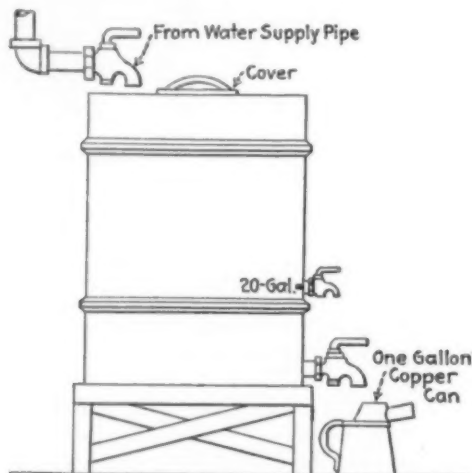
TO prevent the formation of scale in its feedwater heater, when operated in bad water districts, The J. S. Coffin, Jr., Company, 36 Grand avenue, Englewood, N. J., has devised a process, on which patents are pending, which permits the cleaning of the heater at a negligible cost. The equipment, which has been added



Location on the Locomotive of the Equipment for Cleaning a Coffin Feedwater Heater

to the heater and is carried in the locomotive, consists of a tee-connection, two drain valves and a steam valve with a 1/16-in. choke.

Referring to the illustrations, the water in the branch pipe is drained through the valve *A* after which the valve is closed. The boiler check *C* and the valve *B* are then closed and the plug *D* is removed from the tee-connection. One gallon of cleaning solution is then poured into the branch pipe and the plug *D* is reapplied. The boiler check *C* and the valve *B* are then opened. The drain valve *E*, located in the condensate line, is then opened and the solution is allowed to drain out to the ground until the locomotive is ready to leave the terminal, when



One of the Storage Containers

the valves *E* and *B* are closed. The pump should not be operated during the cleaning operation.

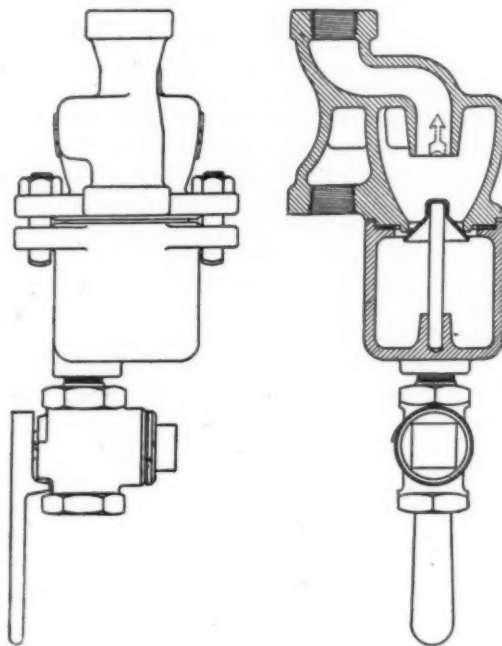
The condensing steam, fed to the branch pipe through the valve *B*, will force the cleaning solution through the heater discharge line, where the solution is diluted in the discharge side of the heater. From there it gradually works through the heater to the valve *E* in the condensate line, where it is drained to the ground. No chemicals remain in the system after about one hour.

The solution used consists of cold water, raw muriatic acid and "Super Incontrol," in the correct proportions. This solution is stored in containers, one of which is illustrated. Each container holds sufficient solution for 40 cleanings.

Coffin feedwater heater systems equipped with this process are operating in numerous bad-water districts and no trouble is experienced in keeping the heaters free of scale formation.

Centrifugal Dirt Collector and a Conductor's Valve

TO complete its line of centrifugal dirt collectors, the Westinghouse Air Brake Company, Wilmerding, Pa., has developed a design suitable for installation in a 1/2-in. pipe. It embodies improvements common to the design for horizontal installation; viz., the detachable large capacity dirt chamber and the



Westinghouse 1/2-in. Centrifugal Dirt Collector with Vertical Pipe Connections

check valve which isolates the dirt chamber from the brake system when a heavy reduction in pressure is made. It may be furnished with or without a drain cock.

The same company has developed a conductor's valve for use on cabooses to meet the demand for more flexible control of brake-pipe reduction than is possible with the cut-out cock usually employed. This device is of the rotary valve type and has a port opening through the rotary valve from the brake pipe to atmosphere that varies from minimum to maximum as the handle is moved from left to right. A gradual opening

of the brake-pipe connection can thereby be obtained and any desired rate of reduction in the train line can be secured.

A Locomotive Blow-Off Cock for Narrow Clearance

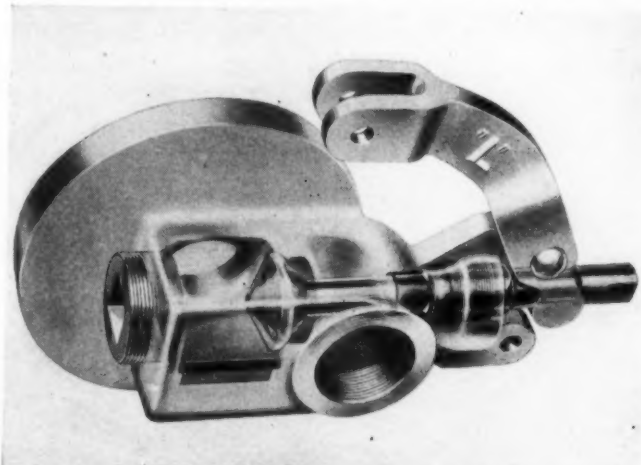
THE standard location for locomotive blow-off cocks, whether mounted with or without sludge-removing pipes, is on each side of the firebox near the front or low corners, about one row of staybolts above the mud ring.

Many of the new locomotives recently designed have, for the purpose of obtaining the largest possible grate area, included fireboxes so wide as to approach the limiting side clearance of the railroads. This makes it of paramount importance that a blow-off cock be used which extends outwardly from the firebox for the minimum possible distance.

With these requirements in mind a new design of blow-off cock, manufactured by the Bird-Archer Company, New York, is now made available. As shown in the illustration, this blow-off cock, while retaining all of

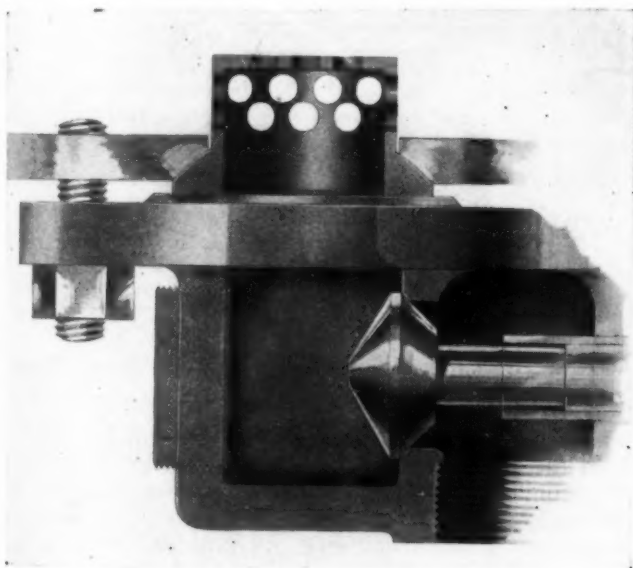
is the fact that it can be used to blow from two boiler connections at the same time. This may be arranged by removing the brass inspection plug and fitting a pipe connection thereto.

The lever, bushing, packing gland and the valve and



The Bird-Archer Locomotive Blow-Off Valve for Narrow Clearances

stem unit are standard and interchangeable with other blow-off cocks of Bird-Archer design.



A Sectional View of the Valve Attached to the Locomotive, Showing the Joint-Ring Strainer

the features of the old types, is arranged with the valve stem mounted parallel to the side sheet.

It was possible in this design to shorten the side clearance requirement for the blow-off cock to less than 5 in. This includes the allowance for the fitting of the joint ring in mounting.

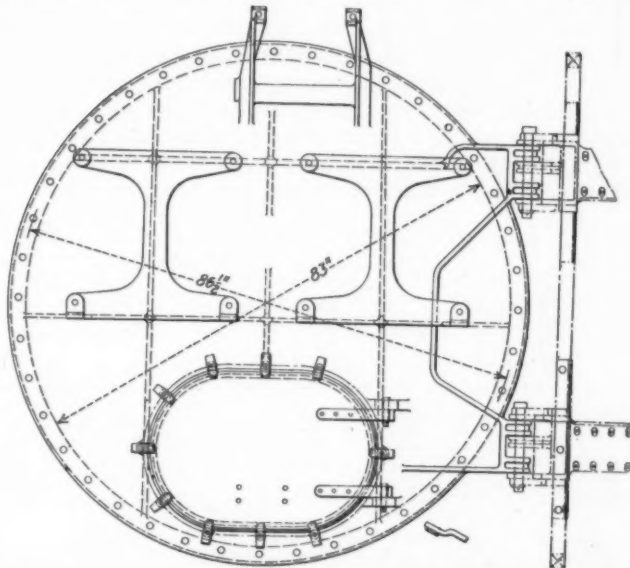
This type of blow-off cock is adapted for mounting with internal sludge-removing pipes, such as are furnished with the Bird-Archer sludge removers. Where sludge removing pipes are not used, a joint strainer of the Bird-Archer standard design is furnished to prevent obstructions which might interfere with the closing of the valve.

This type of blow-off cock may be ground in under pressure without removing from the boiler and, in addition, the valve and stem may be removed from the body without breaking the ground-joint mounting on the boiler. A plug is provided for this purpose.

A still further advantage in this type of blow-off cock

Cast-Steel Smokebox Front With Integral Fittings

THE Baldwin Locomotive Works, Philadelphia, Pa., has applied for patents on a cast steel smokebox front, on which is cast integral two air-compressor brackets, a bell stand designed for Alemite grease fitting, Okadee smokebox hinges and the inspection-

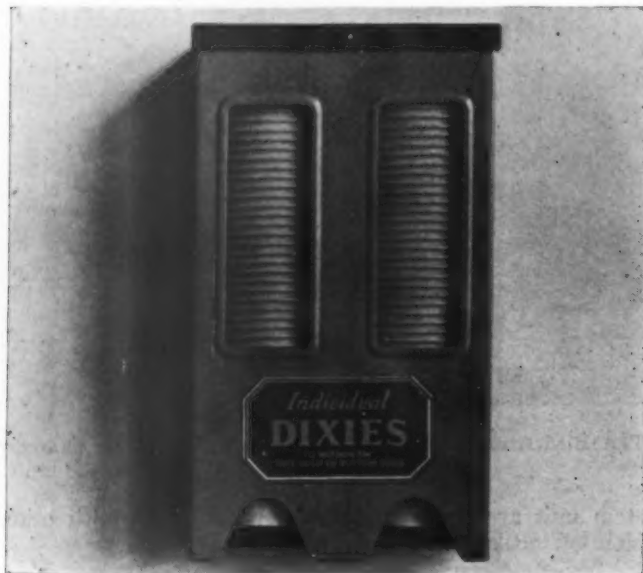


Plan View of the Baldwin Cast-Steel Smokebox Front Door With Fittings Cast Integral

door hinges. Stiffening ribs are cast on the inside of the door to prevent warping. The purpose of this construction is to eliminate holes in the front door, thus preventing possible air leaks; the door is also designed so as to facilitate erecting.

Dixie Cup Dispenser

THE illustration shows a drinking-cup dispensing machine manufactured by the Individual Drinking Cup Company, Easton Pa., for use in club, sleeping and parlor cars. It is decorated in grey and

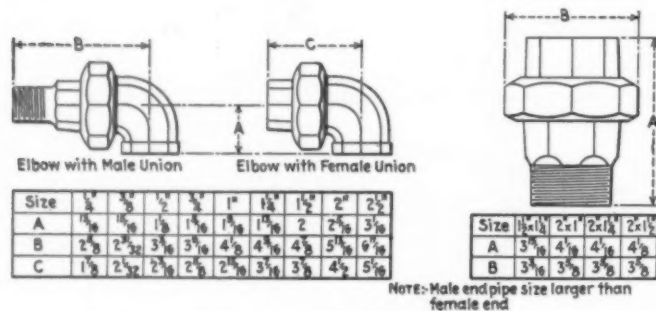


The Dixie Drinking-Cup Dispensing Machine

blue Duco finish. The machine is 9 in. long, 5 in. wide, 13 in. deep and has a capacity for 70 paper cups, 35 in each row. The cups are removed from the bottom of the machine.

Corley Elbow and Tee Unions

THE Corley-DeWolfe Company, 323 Pine street, Elizabeth, N. J., has recently announced a new line of ball-seat, elbow, tee and air-compressor unions. These unions are made either hexagon or octagon in shape, which permits the use of monkey, spanner, alligator, or pipe wrenches. They are provided with a bronze seat which is a heavy cast ring pressed and expanded into a machined dove-tail recess. This in-



Left; Union Elbows with Inside and Outside Thread—Right; Air Compressor Union

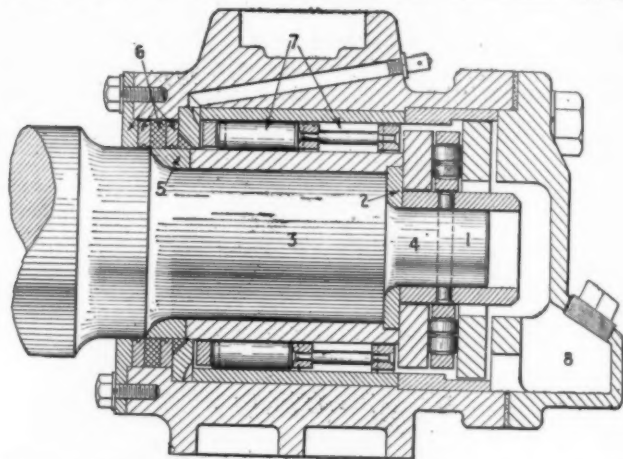
sure a tight seat that will not loosen and is an integral part of the union. The ball end of the union is of malleable iron, machined and ground to a master radius from the center of the circumference of the pipe thread. The collar is undercut so as to permit the installation of the joint where the pipes are slightly out of line. The nut is made extra heavy and is carefully machined to close

limits. The collar is turned with a filet which adds extra strength. In making the nut, the hole is first bored and then reamed when the nut is tapped, assuring correct alinement. These unions are designed for steam, water, gas or air and a working pressure of 300 lb. The joint between the bronze seat and the malleable-iron ball end is designed to be used repeatedly without a gasket. It is ground to master gages and not in pairs. All parts are interchangeable.

The Stearns-Stafford Roller Bearing Modified

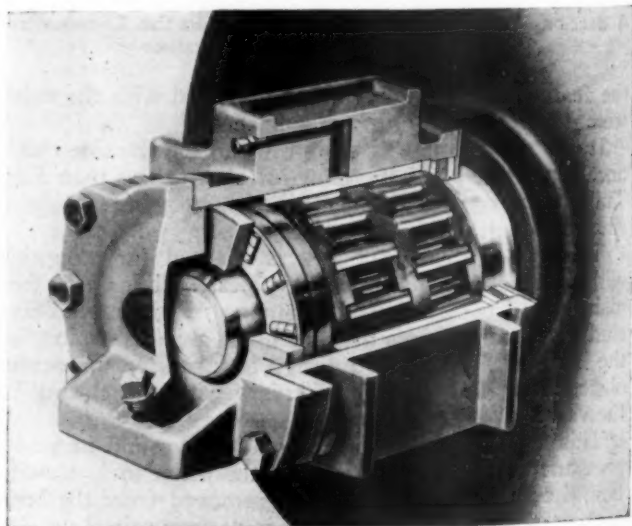
THE Stearns-Stafford Roller Bearing Company, Lawton, Mich., has redesigned its railway-car roller bearing for the purpose of improving its performance and of reducing wear.

On the old-style bearing it was necessary to turn the axle, and to thread the extreme end for a nut—which



General Assembly of the Stearns-Stafford Roller Thrust-Type Bearing

was then called an adjusting nut and was intended to hold the thrust assembly in place—and to shape out a slot for the lock strip. The threading operation on the end of the journal, which is marked (1) in the illustration, is now eliminated. A hardened sleeve, called



Sectional View Showing the Staggered Arrangement of the Solid Rolls

a thrust collar, is now used. A plate of soft steel (2) is placed in a counterbore on the inside of the bushing, against which the collar is pressed and then riveted. This plate prevents slipping. The only work required to accommodate the bearing is the turning of the diameters marked (3) and (4). A filler ring (5) is pressed against a bushing. Breaking this allows the bushing to be removed. The oil-retaining parts and back cover (6) are felt and oil rings. On the old bearing this consisted of piston rings. The rollers (7) are solid and held in a permanent staggered relation to each other in pockets, as shown in one of the illustrations. By the old method these rolls turned on a center. The cover (8) is held in place by six bolts, instead of studs, and also contains an oil reservoir, while the old cover was straight.

Gold End Valve and Coupling Redesigned

THE Gold Car Heating & Lighting Company, Brooklyn, N. Y., has made several changes to its line of steam heat specialties based on information gained from operating experience. A 2-in. locomotive pressure-reducing valve has been designed along the same lines as the 1½-in. regulator valve No. 1014, with double piston rings and with the control valve located in the side of the body for accessibility in cleaning or grinding. To prevent damage to the main body by wear or excessive grinding, the control valve seats against a re-



Gold 2-In. Locomotive Pressure-Reducing Valve

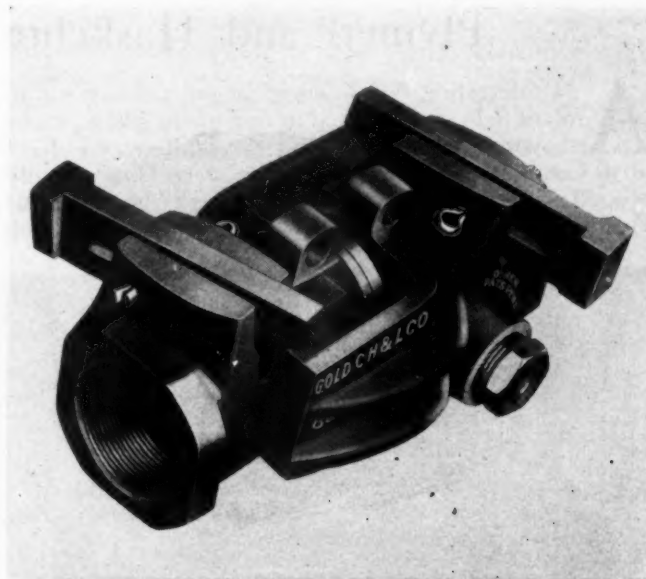
newable seat bushing which can readily be replaced.

The 2-in. end valve, No. 1423, has been shortened to give proper clearances to the metallic connections and its rear portion strengthened to care for the weight put upon it by the change from rubber hose. The cam and piston principle of this valve, with but two working parts, greatly simplifies the construction.

The No. 825-S 2-in. coupler is designed to give a full

2-in. flow of steam throughout, including the gasket orifice. The tension and torsion of the metallic joints to which the couplers are subjected cannot unlock this coupler because of a newly designed self-wedging lock made of carbon steel.

The base of the wedge is considerably wider than the top and, with its housing of similar shape, friction is set up along the entire length of the housing the moment the



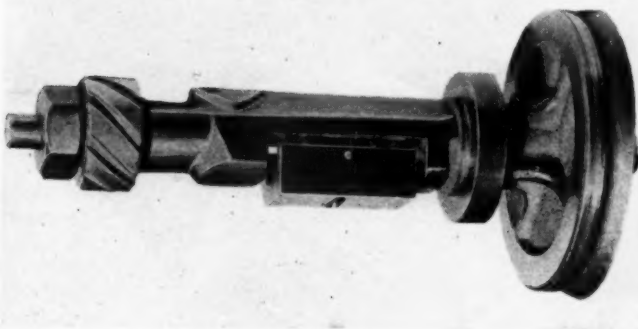
Gold 2-in. Straight-Shank Coupler with a Redesigned Locking Mechanism

wedge touches the toe of the opposite coupler in the act of locking. The cotter pin, shown in the illustration, acts as a stop, preventing the wedge from being forced out.

To facilitate the mounting of the coupler, the boss around the inlet has been squared to afford a better grip. The couplers are fitted with gravity condensation relief traps which are essential when used with metal connections.

Application Piston for Distributing Valves

THE Westinghouse Air Brake Company, Wilmerding, Pa., is now supplying an improved type of application piston for distributing valves which are expected to reduce maintenance costs. The piston-



Westinghouse Application Piston for Distributing Valves

stem guide is of more ample proportions, which reduces wear to a minimum and insures correct alinement. The periphery of the guide has a set of helical grooves which tend to keep the bushing scraped free of dirt.

New Applications of Plymetl and Haskelite

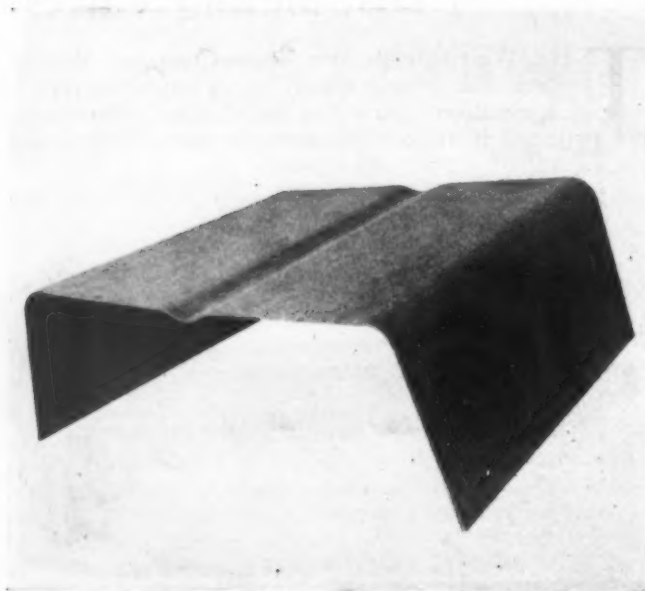
AN interesting development in the railway equipment field is illustrated in one of the photographs showing the gasoline rail car built by the J. G. Brill Company. Plymetl, the metal-faced Haskelite plywood, is used for the engine housing, completely enclosing the power unit. This construction is not only



The Engine Housing in This Brill Model 75 Rail Car Is Made of Plymetl

more durable and more resistant to fire, but it also reduces the noise of the engine and protects the operator. The steel-faced Plymetl panels are especially treated with zinc to prevent rusting and any general tendency to deteriorate which might be caused by hot gases and oils from the engine.

In the new cars built by the Canadian Car & Foundry Company for the Canadian National blood-albumen



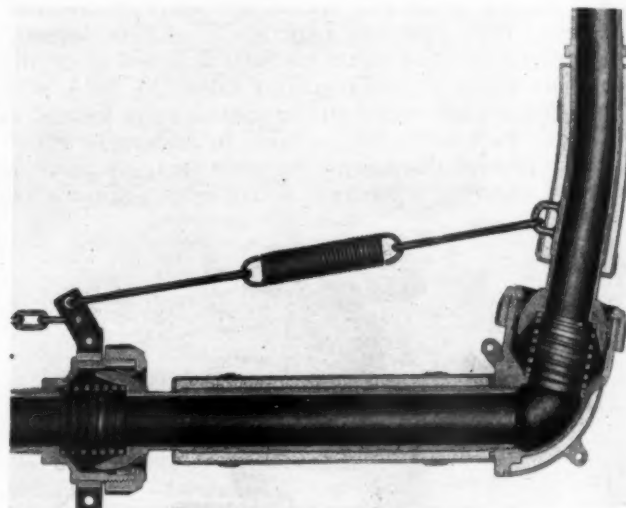
A Molded Haskelite Twin-Seat Back

glued plywood is used for frieze boards, roofs headlinings. Plymetl is also used in these Canadian cars for the engine-room walls. Here also the Plymetl panels afford greater fire protection and also longer life, since Plymetl is exceptionally resistant to the impacts these walls must withstand.

Molded twin-seat backs of Haskelite is another new use for this material. The light-weight Haskelite for this purpose saves considerable weight and with its strength contributes to the greater comfort and safety of the railway passenger.

Barco 2-In. Metallic Steam-Heat Connections

SINCE the description of the 2-in. steam heat insulated connections manufactured by the Barco Manufacturing Company, 1801 Winnemac avenue, Chicago, for use between passenger cars and on the rear of tenders, which appeared on page 1490D80 of the June 25, 1928, Daily Edition of the *Railway Age*, several



Barco 2-In. Steam-Heat Connections for Coaches Fitted with Hardened Alloy-Steel Balls

changes have been made in their design. The welding of the tubing in the balls has been replaced by rolling the seamless steel tubing into hardened alloy-steel balls similar to the expanding and rolling of a flue into a flue sheet. Drop-forged steel nuts are now used in place of the gasket retainer rings previously used. The change facilitates the replacement of gaskets when necessary.

The new connection is made up almost entirely of drop forgings and seamless-steel tubing, being much stronger than the former castings and allowing repairs to be made by straightening or welding when the connection meets with an accident, instead of having to replace the casting as was formerly the case.

THE POSTAL TELEGRAPH AND CABLE CORPORATION announces the establishment of a pension and benefit plan for its 20,000 employees, to go into effect on July 1; and an initial fund of \$5,000,000 has been appropriated for the purpose. The plan includes sick and accident benefits. Male employees may be retired at the age of 60 and women at 55. The annual amount of the retirement pension is to be 1½ per cent of the average annual pay of the employee, during the whole term of his service, multiplied by the number of years of service.

New Books

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian,
Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

The Design, Application and operation of Railway Roller Bearings, by Walter C. Sanders. Illustrated reprint of paper before Cleveland Railway Club. 27 p. Pub. by Timken Roller Bearing Co., Canton, Ohio. Apply.

A History of Mechanical Inventions, by Abbott Payson Usher. Chapters include a discussion of the place of technology in economic history. The development of the various groups of machines is traced from pre-Christian antiquity to the present. Railroaders will be particularly interested in the chapters on production and application of power: 1500-1850, and on the production and distribution of power since 1832. Illustrated, 390 p. Pub. by McGraw-Hill Book Co., Inc., New York City. \$5.00

Photomicrographs of Iron and Steel, by Everett L. Reed. An unusual book of particular reference value to those interested in metallurgy. 253 p. Pub. by John Wiley & Sons, Inc. \$4.00.

Yearbook of the American Bureau of Metal Statistics—Ninth Annual Issue 1928. Production, consumption and operating details for various kinds of metals. Some prices, and exports and imports are also given. 112 p. Pub. by American Bureau of Metal Statistics, New York City. \$2.00.

Central Northwest Regional Survey—Minnesota Freight Rate Structure by Wayne E. Butterbaugh. A study in the field of transportation made by a group of University of Minnesota students who have organized the Central Northwest Regional Survey. Other forms of transportation will be studied later. 40 p. Published by the University of Minnesota Press, Minneapolis, Minn. 50 cents.

Periodical Articles

Engineering and Art in Community Life, by C. C. Whittier. A really unusual radio address. "By the time the community was able to take a good bath, the railroad engineers laid out and built the railroads, the mechanical engineers designed and constructed locomotives and cars. Then along came Mr. Pullman with his bed under his arm placed it in a car so that the people might sleep on their way back and forth for business or pleasure." p. 314. Western Society of Engineers Journal, June 1929, p. 314-317.

Refinements in Airplane Cabin Furnishings, by John F. Hardecker. "Influence of Pullman, Bus, Auto and Ocean Liner evidenced in larger air transports." Illustrated. Airway Age, June 1929, p. 810-814.

The State of Agriculture—Grain Rate Reduction. National City Bank Monthly Letter, June 1929, p. 74.

Why Ask Prosperous Industries to Support Those "in the Red"? by Charles C. Paulding. The Vice President—Public Relations of the New York Central analyzes the Hoch-Smith resolution and its effect on business. Magazine of Business, June 1929, p. 669, 671, 714.

Looking Backward

Fifty Years Ago

The court of chancery of New Jersey holds, in a recent decision, that a person intending to cross a railroad track is bound to look and listen for an approaching train before going over it, and if he fails to do so, and injury ensues, he is without remedy; or if he looks and listens, and sees or hears a train approaching, and then daringly assumes the hazard of attempting to cross in advance, and fails, he must bear the consequences of his folly.—*Railway Age*, June 19, 1879.

The long pending contest in Colorado between the Atchison, Topeka & Santa Fe and the Denver & Rio Grande [now the Denver & Rio Grande Western] assumed a serious and exciting phase on June 11 when the judge of the district court at San Luis issued an injunction forbidding the Santa Fe from interfering with the Rio Grande in taking possession of its road and operating it. The court order was followed by the seizure of the road by armed men in the employ of the Rio Grande, three men being killed in the struggles. The situation has been further complicated by a court order placing the Rio Grande in the hands of a receiver.—*Railway Age*, June 19, 1879.

Twenty-Five Years Ago

The Mississippi Railroad Commission has granted the petition of the Lumbermen's Association of that state and decreed that the railroads be compelled to pay for delaying freight shipments the same amounts as shippers are now taxed for delaying cars. It has ordered that reciprocal demurrage on a uniform basis be established.—*Railway and Engineering Review*, June 25, 1904.

Fred W. Green, assistant to the general manager of the Union Terminal Railway of Sioux City, Iowa, has been appointed superintendent of terminals of the St. Louis, Iron Mountain & Southern [now part of the Missouri Pacific] at Little Rock, Ark. Arthur H. Feters, heretofore assistant mechanical engineer of the Union Pacific, has been appointed mechanical engineer of that road. Walter L. Ross has been appointed general passenger agent of the Toledo, St. Louis & Western [now part of the New York, Chicago & St. Louis], with headquarters at Toledo, Ohio.—*Railway Age*, June 24, 1904.

Ten Years Ago

In the Central Western Region there was an increase in the loading of grain, for the week ended June 9, amounting to 64 per cent over the same week of last year; live stock loadings increased 34 per cent in the same region. Grain loadings in the Northwestern region showed an increase of 100 per cent over last year, while grain products, livestock and miscellaneous freight also showed increases.—*Railway Age*, June 20, 1919.

The Railroad Administration appears to have suddenly become obsessed with the fear that it is over-maintaining the railways and that heroic measures must be adopted to prevent this. An order was issued by the Director-General on May 27, which has since been annulled for June, instructing Federal managers to so hold down maintenance of way expenditures that the ratio of these expenditures to operating revenues for June would not exceed the average yearly ratio during the three-year test period.—*Railway Age*, June 20, 1919.

Odds and Ends of Railroading

Ever-Present Conscience

The conscience fund of the Chicago & North Western was enriched \$30 recently, when a shabbily dressed man walked into the general agent's office at St. Louis, Mo., and handed over that sum. He explained that he had become convinced that he would not go to Heaven unless he paid for the stolen rides.

Railroad Talk

The boomers spoke a language of their own, and many of the terms these imaginative and romantic travelers invented still remain in railway parlance. The following is an attempt to establish a glossary of the terms used. It is by no means complete, and additions to it will be welcomed:

Employees	
Engineman	Hog head
	Eagle eye
	Speed gager
	Throttle puller
Fireman	Positive block
	Diamond pusher
	Tallow pot
	Fire boy
Conductor	Coal heaver
	Big O
	The brains
	The skipper
Brakeman	Bake head
	Roughneck
	Shack
	Ground hog
	Fielder
	Car catcher
Telegraph operator	Stinger
	Lightning slinger
	Brass pounder
Section laborer	Ham
	Jerry
Clerk	Snipe
	Paper weight
	Pin head
	Pencil pusher
Yardmaster	Dinger
	Switch hog
Railway policeman	Gumshoe
	Cinder dick
	Gandev dancer
Extra gang laborer	Car whacker
Car inspector	Snake
Switchman	Rail
Any railroad employee	Number grabber
Yard clerk	King snipe
Section foreman	Master maniac
Master mechanic	Old man
Superintendent	Whiskers
General manager	Madhouse
Enginehouse foreman	Short tail
Non-union employee	

Rolling Equipment	
Locomotive	Hog
	Mill
	Kettle
	Lion
	Teapot
Mallet locomotive	Sacred ox
Switching locomotive	Goat
Refrigerator cars	Freezers
	Reefers
	Bull fighter
Empty coach	Rubberneck
Observation car	Gon
Coal car	Band wagon
Pay car	Family disturber
Any car	Wagon
	Buggy
Pullman car	Snoozer
Business car	Drone cage
	Brain box
	Can
Tank car	Dynamiter
Trouble car	Varnish box
Passenger car	Side door Pullman
Box car	Whale belly
Steel car	Crumb box
Caboose	Dog house
	Crummery

Miscellaneous Equipment	
Derail	Hop toad
Lantern	Shiner
Switch	Gate
Telegraph instrument	Bug
Train order	Flimsy
	Tissue
Telegraph wires	Strings
Lamp	Hayburner
Typewriter	Mill
	Thrashing machine
Semaphore signal	Paddle
	Bug
	Board

Tool box under caboose	Possum belly
Heated journal water car	Keeley
Journal brass	Jewel
Torpedoes	Caps
	Guns
Impact register	Damn liar

Trains	
Extra fare train	Due train
Freight train	Rattler
Emigrant train	Zulu
Fast freight train	Hot shot
	Red ball
Employees' train	Modoc
Slow passenger train	Plug
Slow freight train	Drag
Relief train	The hook

General	
Emergency air application	Big hole
Rush telegram	Pink
Arrival	Blow in
Sixteen-hour law	Bear
Proceed signal	Highball
Trip pass	Monkey money
Meal ticket	Pie book
Yardmaster's office	Knowledge box
Anyone riding on a pass	Deadhead
To cool a hotbox	Freeze a hub
To miss a meal	Fly light
To leave the service	Pull a pin
Boasting	Blowing smoke
Run without orders	Run on smoke
To die	Join the birds
Third trick	Graveyard watch
To be disciplined	Called on the carpet

Commuting as a Fine Art

Many persons express the opinion that suburban dwellers endure the monotony of a daily ride back and forth from a home 50 miles or more from the Grand Central Terminal or Pennsylvania Station simply to gain the advantages of a quiet home in the country. But few passengers on the commuting trains find the trip boring. Some have devised pleasant ways to pass the time, going and coming, and others appear actually disappointed when they must end their diversions and hurry off the train to work.

One of the favorite pastimes is bridge. Somehow the same foursomes manage to get together, crowd or no crowd, day after day, and out will come a deck or two of cards. Each bridge group will at times have its interested hangers-on. Many of these groups have developed an almost uncanny skill of ending a round at precisely the moment the train whisks them into the station.

Some of the best players in the suburbs are reported to owe their ability to constant practice aboard train. They will tell you anybody who can manage to present a consistent game in such a setting should make out pretty well in the conventional party.

There are thousands of members of an unorganized class in current events on the commuter trains every day. Any member could qualify as an advanced student in contemporary history because each one has time not merely to peruse, but to absorb the news of the day. Some clamber aboard lugging not one, but two or three newspapers, and it is the boast of many that not a line in any one of these papers escapes their notice. Magazine stories help some passengers to prepare themselves for a hectic day at the office; books offer another means of literary entertainment. A number of college students "learn their lessons" on the train.

Lasting friendships spring up from the idle banter and pleasant associations which commuting fosters. But not all the conversation is of a social nature. Business deals are often consummated between terminals. Any number of salesmen may be seen figuring out their routes during the morning hours, and checking their sales on the way "out" in the evening. Many a sample case has been opened to profit between Yonkers or Mount Vernon and Grand Central.—New York Times.

NEWS of the WEEK



THE BOARD OF ARBITRATION which has been holding hearings in Washington since May 23 on the demands of the shop employees of the Southern for an increase in wages on June 18 issued an award providing for an increase of 6 cents per hour for about 4,600 of the shop employees and 5 cents an hour for about 4,400 of them. The board consisted of two selected by the company, two by the shop craft organizations and two selected by the Board of Mediation. The dispute was referred to the arbitration board following mediation by representatives of the board, after the employees had voted to strike on March 31.

A Correction

The capacity of the Reading depressed car illustrated at the bottom of page 1312 of the June 1 issue of the *Railway Age* was given as 255,000 lb. This should have been 275,000 lb.

Northern Pacific Land Grant Bill Passed

The House of Representatives on June 18 passed the bill which had previously passed the Senate, S.669, to provide for further judicial proceedings for the adjustment of the controversy between the federal government and the Northern Pacific over the land grants to that company made in 1864 and 1870. The bill has been before Congress for two sessions and is the result of an investigation by a special committee of members of Congress extending over several years. It provides for the removal from the grants of certain lands embraced within forest reservations, subject to compensation if the courts find that any is due from the United States, and directs the Attorney General to institute suits for the adjudication of the respective rights of the government and the company relating to 2,672,268 acres of land.

Reading Oil-Electric Train

The first multiple-unit oil-electric train to be operated in the United States was exhibited at the Reading Terminal, Philadelphia, Pa., on the afternoon of June 19. The train was placed in service between Reading, Pa., and Wilmington, Del.

The train consists of two cars, the motor car containing the engine room, a mail compartment, a baggage room, a

smoking compartment and a passenger compartment, the other car being a trailer.

The motor car is 73 ft. in length, seating 15 persons in the smoking compartment and 19 persons in the passenger compartment. The trailer is 60 ft. in length and seats 60 persons. The engine is of 330 hp., which gives a maximum speed of 70 m. p. h. hauling a train that weighs approximately 100 tons.

A novel feature of the train is the double-operating control, which makes it possible to operate the train from either end of the motor car or from the trailer.

The motor car was built by the Bethlehem Steel Company, the trailer by the J. G. Brill Company, and the electrical equipment was furnished by the Westinghouse Electric & Manufacturing Company.

I. C. C. Valuation of Pennsylvania

The Interstate Commerce Commission on June 19 made public its final valuation reports covering 68 of the companies in the Pennsylvania Railroad System as of basic valuation dates ranging from June 30, 1916 to June 30, 1918, stating final values amounting to \$1,844,088,951 as contrasted with the total property investment of the 68 companies as of the dates used amounting to \$1,681,210,084.

The reports include the major properties of the system, but they do not include 19 companies for which the commission had previously issued final valuations amounting to \$40,879,208 or 11 companies for which tentative valuations, amounting to \$127,232,654, had previously been issued. These added to the \$1,844,088,951 would make a total of \$2,012,200,813 for the 98 companies. A detailed discussion of this Pennsylvania valuation report will appear in the next issue of *Railway Age*.

Testimonial Dinner to C. E. Denney

A testimonial dinner to Charles E. Denney, newly-elected president of the Erie, was tendered by Walter L. Conwell, president, Safety Car Heating & Lighting Co., and Charles R. Ellicott, vice-president, Westinghouse Air Brake Company, at the Montclair Golf Club, Verona, N. J., on June 14. L. F. Loree, president of the Delaware & Hudson, presided.

The menu card, following closely in

its exterior appearance the circular recently issued by the Erie to advertise its new "Erie Limited," when opened disclosed five photographs showing Mr. Denney at various ages. Three of these photographs were genuine, but two of them, one purporting to show the subject at the age of eighteen months and another as an elderly man, taken in "the year when Erie common touched 1000," conveyed a suggestion of caricature.

Among those in attendance, in addition to those already named, were:

W. G. Besler, chairman of the board, Central of New Jersey; S. G. Down, vice-president, Westinghouse Air Brake Company; C. W. Galloway, vice-president, Baltimore & Ohio; G. A. Blackmore, president, Union Switch & Signal Co.; E. M. Rine, vice-president, Delaware, Lackawanna & Western; R. C. Morse, general superintendent, Pennsylvania; H. H. Westinghouse, chairman, Westinghouse Air Brake Company; W. M. Wampler, president, Elcon Company; R. S. Binkerd, of the firm of Jas. H. Oliphant & Co.; J. E. Muhlfeld, consulting engineer; J. F. MacEnulty, vice-president, Pressed Steel Car Company; W. G. Black, mechanical assistant to the president, Erie; Col. E. A. Simmons, president, Simmons-Boardman Publishing Company; J. A. Dixon, vice-president, Safety Car Heating & Lighting Co.; H. S. Walker, assistant to general auditor, Union Pacific; J. S. Henry, manager, northeastern district, Safety Car Heating & Lighting Co.; E. A. Condit, Jr., vice-president, Rail Joint Company; W. M. Hager, vice-president, American Car & Foundry Co.; P. H. Johnson, president, Chemical National Bank; S. C. Munoz, of the Munoz Finance Corporation; T. Stephens, president of the Bank of Montclair; E. D. Kilburn, vice-president, Westinghouse Electric & Mfg. Co.; Arthur Loasby, president, Equitable Trust Company; C. W. Weston, vice-president, Chatham & Phoenix National Bank & Trust Company; Clark Denney, son of President Denney; J. E. Dixon of East Orange, N. J.; and Ralph Bollard, R. M. Kilgore, A. F. Mack, J. I. Simmons, E. W. Leake, Jr., Mayor C. D. Phillips, J. F. Fielder, F. C. Lowry, L. N. DeVausney and A. C. Fetterolf—all of Montclair.

International Railway Congress at Madrid in 1930

The next International Railway Congress will be held at Madrid, Spain, from May 5 to 15, 1930. Reports and reporters for the United States will be as follows:

The Use of Concrete and Reinforced Concrete on Railways—F. B. Freeman, chief engineer, Lines Buffalo and East, New York Central.
Resistance of Rails Against Breakage and Wear—R. B. Abbott, assistant general superintendent, Reading.
Investigation into the Static and Dynamic Stresses in Railway Bridges—P. G. Lang, Jr., engineer of bridges, Baltimore & Ohio.
Recent Improvements in Permanent Way Tools, and in the Scientific Organization of Maintenance Work—H. J. Driessen, division chief, Netherlands Railways.
Locomotives of New Types; in Particular, Turbine and Internal-Combustion Locomotives—A. Lipetz, consulting engineer, American Locomotive Company.

(Continued on page 1482)

Operating Statistics of Large Steam Railways—Selected Items for April, 1929, Comp

Region, road and year	Average miles of road operated	Train-miles	Locomotive-miles		Car-miles		Ton-miles (thousands)		Average number of locomotives on line				
			Principal and helper	Light	Loaded (thousands)	Per cent loaded	Gross. Excluding locomotives and tenders	Net. Revenue and non-revenue	Service-able	Un-service-able	Per cent un-service-able	Stored	
New England Region:													
Boston & Albany.....	1929	407	199,770	210,992	19,248	5,103	68.0	258,033	93,955	102	19	15.3	33
1928	407	182,769	194,099	19,715	4,964	67.7	250,995	92,314	102	20	16.4	24	
Boston & Maine.....	1929	2,070	397,646	465,674	50,443	13,503	72.8	665,953	258,759	269	38	12.4	57
1928	2,074	401,606	517,086	44,032	12,363	69.8	625,280	238,638	260	57	18.1	29	
N. Y., New H. & Hart.....	1929	2,102	506,376	573,582	40,795	16,564	69.7	845,290	334,458	280	83	22.9	14
1928	2,130	525,616	584,035	35,798	16,184	67.2	859,735	344,645	315	61	16.3	48	
Great Lakes Region:													
Delaware & Hudson.....	1929	875	326,735	434,044	42,570	10,699	66.2	622,253	294,701	236	29	10.8	77
1928	875	319,490	432,258	49,058	9,880	63.4	600,822	279,270	246	36	12.6	86	
Del., Lack. & Western.....	1929	998	539,751	607,622	69,979	18,973	66.7	1,062,826	434,650	241	55	18.5	8
1928	998	546,635	620,151	71,734	17,856	66.2	1,013,970	423,131	251	56	18.3	8	
Erie (inc. Chi. & Erie)....	1929	2,317	852,672	929,162	71,575	39,132	64.5	2,269,940	920,073	399	98	19.6	44
1928	2,317	868,644	949,899	78,783	37,278	63.5	2,190,518	898,339	413	119	22.4	44	
Lehigh Valley	1929	1,343	526,064	578,242	65,088	17,627	66.2	1,012,339	431,954	298	99	24.9	53
1928	1,346	521,655	573,866	66,815	16,888	64.2	983,656	413,363	358	74	17.1	88	
Michigan Central	1929	1,822	599,152	605,655	17,985	22,043	62.5	1,176,090	386,226	194	40	17.1	19
1928	1,822	570,710	578,037	16,222	19,698	60.4	1,092,830	366,698	200	78	27.9	30	
New York Central.....	1929	6,467	2,015,301	2,269,985	164,398	80,996	62.1	4,799,949	1,968,646	944	369	28.1	170
1928	6,459	1,959,762	2,177,677	153,507	76,665	61.7	4,542,037	1,848,007	1,056	343	24.5	295	
New York, Chi. & St. L.....	1929	1,665	643,560	650,627	7,496	21,719	63.7	1,206,945	448,564	209	61	22.7	32
1928	1,665	623,613	631,964	5,559	20,588	62.2	1,158,059	425,918	231	59	20.2	59	
Pere Marquette	1929	2,178	444,490	447,959	5,340	11,510	63.7	672,614	286,173	176	36	17.0	8
1928	2,181	416,359	423,181	6,203	11,384	63.6	648,363	265,728	180	42	19.0	23	
Pitts. & Lake Erie.....	1929	231	127,314	128,617	1,312	4,887	63.3	374,318	213,281	53	13	19.4	13
1928	231	110,567	113,032	1,417	3,895	59.6	315,094	172,284	54	18	25.2	12	
Wabash	1929	2,497	855,270	888,807	10,794	25,455	63.1	1,447,672	514,700	283	74	20.7	15
1928	2,497	773,464	809,407	12,467	23,415	62.6	1,317,577	461,493	302	64	17.5	53	
Central Eastern Region:													
Baltimore & Ohio.....	1929	5,536	1,926,055	2,285,151	172,446	58,446	63.5	3,757,347	1,742,671	1,015	194	16.0	114
1928	5,534	1,802,009	2,122,282	169,012	54,180	62.0	3,502,293	1,610,012	993	271	21.4	149	
Central of New Jersey.....	1929	691	272,730	294,001	45,428	8,117	58.6	538,109	246,896	176	33	15.9	26
1928	691	258,175	280,561	47,740	7,857	59.1	519,310	245,223	181	34	15.8	36	
Chicago & Eastern Ill.....	1929	946	228,562	229,218	2,640	6,373	65.4	369,496	155,461	85	74	46.6	20
1928	945	221,354	221,964	3,349	5,857	62.9	348,847	149,416	113	56	33.3	46	
Clev., Cin., Chi. & St. L.....	1929	2,371	698,402	722,055	15,586	23,085	63.8	1,394,694	613,264	330	121	26.9	57
1928	2,370	684,037	709,707	15,166	21,843	61.9	1,369,358	610,892	328	111	25.2	63	
Elgin, Joliet & Eastern ..	1929	453	137,752	145,718	6,390	4,075	64.6	301,392	156,876	76	11	12.5	2
1928	461	134,223	142,573	6,190	3,850	63.2	283,007	144,582	78	12	13.1	...	
Long Island	1929	396	48,142	53,724	15,821	646	56.2	42,170	15,850	53	9	14.2	...
1928	396	50,684	52,280	17,098	645	55.8	43,119	17,211	66	8	10.5	...	
Pennsylvania System.....	1929	10,738	3,879,861	4,461,615	415,966	140,786	65.0	9,121,718	4,216,792	2,700	264	8.9	741
1928	10,853	3,742,008	4,244,645	361,776	130,154	64.2	8,291,074	3,736,113	2,845	383	11.9	851	
Reading	1929	1,452	624,174	685,800	50,219	17,350	61.8	1,151,978	555,195	342	65	15.9	48
1928	1,417	612,431	672,996	57,351	16,955	60.2	1,179,993	585,355	330	71	17.6	50	
Pocahontas Region:													
Chesapeake & Ohio.....	1929	2,730	990,849	1,055,876	38,355	34,194	57.8	2,661,414	1,416,303	529	101	16.1	92
1928	2,719	1,016,653	1,096,632	41,031	32,995	56.6	2,622,990	1,395,705	554	89	13.8	104	
Norfolk & Western.....	1929	2,230	788,946	892,990	33,782	30,449	60.6	2,447,423	1,299,035	475	55	10.4	125
1928	2,231	742,537	891,371	29,188	27,471	60.7	2,159,162	1,138,709	524	53	9.2	159	
Southern Region:													
Atlantic Coast Line.....	1929	5,153	813,132	819,216	10,788	22,518	58.9	1,241,769	428,015	438	54	10.9	67
1928	5,105	695,663	700,342	10,761	18,032	60.1	1,008,085	369,464	429	54	11.2	86	
Central of Georgia.....	1929	1,900	299,356	302,861	5,218	7,609	71.4	405,936	170,642	133	19	12.5	8
1928	1,898	266,920	269,041	4,270	6,553	69.0	353,323	145,264	142	24	14.5	11	
Ill. Cent. (inc. Y. & M. V.)	1929	6,710	1,934,366	1,953,653	29,292	52,702	62.5	3,321,054	1,332,507	725	107	12.9	26
1928	6,595	1,912,171	1,931,906	31,493	51,100	61.0	3,310,659	1,347,979	766	98	11.3	36	
Louisville & Nashville.....	1929	5,066	1,532,460	1,614,765	52,438	33,506	61.0	2,219,003	1,034,412	583	100	14.6	48
1928	5,061	1,597,287	1,661,534	56,456	33,406	59.3	2,286,199	1,078,402	603	104	14.7	50	
Seaboard Air Line.....	1929	4,475	653,323	680,860	7,771	17,085	60.8	1,003,053	352,385	260	45	14.8	...
1928	4,484	571,530	589,898	8,755	14,532	60.5	846,268	306,673	267	68	20.3	...	
Southern	1929	6,679	1,564,542	1,599,433	36,168	39,647	64.7	2,189,158	869,179	829	127	13.3	99
1928	6,718	1,456,978	1,487,898	33,631	36,359	62.7	2,071,866	820,794	830	110	11.7	74	
Northwestern Region:													
Chi. & North Western....	1929	8,467	1,347,081	1,412,632	23,306	34,552	62.0	2,022,005	760,145	733	111	13.1	105
1928	8,463	1,334,047	1,398,939	24,845	32,857	63.0	1,872,452	720,223	778	145	15.8	134	
Chi., Milw., St. P. & Pac.	1929	11,244	1,564,773	1,681,296	99,757	47,553	64.2	2,751,652	1,134,348	775	158	16.9	184
1928	11,247	1,474,403	1,572,831	97,307	45,422	65.6	2,568,732	1,055,828	819	145	15.1	207	
Chi., St. P., Minn. & Om.	1929	1,724	283,282	301,464	12,967	6,071	66.0	325,314	127,413	141	31	17.8	25
1928	1,724	285,012	299,669	12,569	6,000	65.7	328,087	131,200	152	26	14.6	24	
Great Northern.....	1929	8,378	798,867	821,721	48,346	28,828	66.8	1,693,136	783,738	480	148	23.6	615
1928	8,156	710,762	734,987	46,497	25,257	68.8	1,422,173	632,941	539	123	18.6	113	
Minn., St. P. & S. St. M....	1929	4,357	462,819	478,380	5,096	13,525	69.1	715,599	311,660	202	46	18.7	25
1928	4,358	479,992	494,619	4,757	12,842	67.9	674,752	287,653	231	29	11.2	28	
Northern Pacific	1929	6,476	751,950	795,426	49,611	27,037	72.4	1,448,022	644,855	436	124	22.1	56
1928	6,414	750,753	802,857	45,589	26,605	71.5	1,439,970	643,567	438	130	22.9	58	
Oreg.-Wash. R. R. & Nav.	1929	2,246	194,577	202,656	13,700	5,594	68.9	318,148	137,084	117	16	11.7	23
1928	2,246	182,035	193,206	15,123	5,527	70.2	316,276	142,178	125	17	12.1	18	
Central Western Region:													
Atch., Top. & S. Fe (incl. P. & S. F.).....	1929	10,416	1,687,855	1,833,406	90,679	55,999	63.5	3,305,745	1,156,729	771	149	16.2	181
1928	10,395	1,556,005	1,701,845	89,789	51,149	64.9	2,978,792	1,072,597	786	133	14.5	202	
Chicago & Alton.....	1929	1,000	278,025	297,187	3,512	7,048	59.2	431,437	165,321	124	24	16.0	20
1928	1,000	265,474	287,805	2,300	6,482	60.8	386,060	146,326	119	34	22.2	23	
Chi., Burl. & Quincy.....	1929	9,317	1,369,722	1,423,408	49,385	43,517	63.9	2,480,403	1,091,636	703	163	18.8	64
1928	9,320	1,329,846	1,378,624	52,113	41,753	65.1	2,323,572	1,016,630	740	165	18.2	100	

News of The Week

(Continued from page 1479)

Improvements in the Steam Locomotive—W. L. Lentz, motive power engineer, New York Central.

Electric Locomotives for Main Line Traction—J. V. B. Duer, electrical engineer, operating department, Pennsylvania.

All-Steel Coaches: Comparison with Cars Built of Wood—E. J. H. Lemon, carriage and wagon superintendent, London, Midland & Scottish.

Relations Between Railways and Seaports—C. M. Jenkins Jones, superintendent, North Eastern area, London & North Eastern.

Methods Used in Classification Yards to Control

the Speed of Cars, and to Insure Contact with Other Cars on Desired Tracks—C. R. Byrom, chief general superintendent, London, Midland & Scottish.

Signaling of Lines for Fast Traffic and in Main Stations, Daylight Signals, Automatic Block System—G. H. Dryden, signal engineer, Baltimore & Ohio.

Economical Traction Methods for Use in Particular Cases, as for example:

(A) Organization of train services on branch lines and of poorly patronized main line trains.

(B) Use of special tractors for switching in smaller yards and for certain work in large yards.

H. B. Voorhees, vice-president, Baltimore & Ohio, and G. H. Emerson, chief of motive power and equipment, Baltimore & Ohio.

Competition of Road Transport—C. B. Sudborough, assistant vice-president in charge of traffic, Pennsylvania.

Use in Railway Work of Machines for Simplifying Statistical and Accountancy Work—W. E. Eppler, until recently comptroller, Delaware & Hudson.

Co-operation of Employees Toward Increased Efficiency and Participation in the Profits—C. C. Cook, maintenance engineer, Baltimore & Ohio.

Methods Followed in Training of Employees, Professional, Technical and Subordinate Classes—L. C. Fritch, vice-president, Chicago, Rock Island & Pacific.

Penetration Railways—Sir Ashley Biggs, late Agent, Madras & Southern Mahratta, and C. W. Lloyd Jones, C. I. E., Agent, Nizam's Guaranteed State Railway.

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled from the Monthly Reports of Revenues and Expenses for 183 Steam Railways, Including 16 Switching and Terminal Companies.

Item	United States		Eastern District		Pocahontas Region		Southern Region		Western District	
	1929	1928	1929	1928	1929	1928	1929	1928	1929	1928
Average number of miles operated	241,280.27	240,624.89	59,912.90	59,952.74	5,633.09	5,623.45	40,151.87	40,018.54	135,582.41	135,030.16
Revenues:										
Freight	\$393,058,446	\$356,572,673	\$174,222,018	\$158,522,057	\$18,802,978	\$16,699,505	\$54,418,730	\$49,354,143	\$145,614,720	\$131,996,968
Passenger	967,509,490	871,071,353	36,315,098	38,010,504	1,279,326	1,462,635	8,448,701	9,470,075	21,466,365	22,128,139
Mail	9,870,260	7,887,517	4,087,299	2,987,993	231,552	206,594	1,355,968	1,178,062	4,195,441	3,514,868
Express	14,393,253	12,514,670	6,654,383	5,788,644	306,930	268,731	2,170,583	2,050,191	5,261,357	4,407,104
All other transportat'n	17,854,294	17,023,223	9,899,694	9,269,290	246,622	223,255	1,336,714	1,245,900	6,371,264	6,284,778
Incidental	10,553,053	9,257,830	5,655,808	4,844,101	255,514	312,532	1,154,948	1,175,908	3,486,783	2,925,289
Joint facility—Cr.	1,043,037	1,119,842	347,343	465,211	11,876	20,432	152,573	145,867	531,245	488,332
Joint facility—Dr.	326,868	393,013	81,508	139,981	4,780	3,137	30,167	33,620	210,413	216,275
Railway operating revenues	513,954,965	475,054,095	237,100,135	219,747,819	21,130,018	19,190,547	69,008,050	64,586,526	186,716,762	171,529,203
Expenses:										
Maintenance of way and structures	73,908,974	70,933,010	29,631,779	28,261,592	3,205,404	2,806,562	9,552,819	9,148,275	31,518,972	30,716,581
Maintenance of equipment	101,512,869	96,195,446	48,355,752	44,958,857	4,502,200	4,437,877	13,102,901	12,839,542	35,552,016	33,959,170
Traffic	10,396,175	10,207,136	3,834,535	3,850,433	282,905	247,126	1,642,416	1,657,718	4,636,319	4,451,859
Transportation	170,897,362	167,259,989	81,069,132	79,229,888	5,297,737	5,358,610	22,745,382	22,381,939	61,785,111	60,289,552
Miscellaneous operat'ns	4,641,714	4,394,349	2,162,000	2,091,122	79,571	89,243	494,394	528,969	1,905,749	1,685,015
General	16,168,205	16,072,024	6,874,121	7,097,691	588,879	600,979	2,187,455	2,092,355	6,517,750	6,280,999
Transportation for investment—Cr.	1,031,466	1,173,468	214,723	159,844	28,802	45,283	48,223	68,129	739,718	900,213
Railway operating expenses	376,493,833	363,888,486	171,712,596	165,329,739	13,927,894	13,495,114	49,677,144	48,580,669	141,176,199	136,482,964
Net revenue from railway operations	137,461,132	111,165,609	65,387,539	54,418,080	7,202,124	5,695,433	19,330,906	16,005,857	45,540,563	35,046,239
Railway tax accruals	32,847,702	30,772,160	13,932,246	13,083,067	1,715,353	1,662,350	4,479,448	4,270,756	12,720,655	11,755,987
Uncollectible ry. revs.	120,811	117,009	57,793	53,058	2,443	1,626	23,313	16,668	37,462	45,657
Railway operating income	104,492,619	80,276,440	51,397,500	41,281,955	5,484,528	4,031,457	14,828,145	11,718,433	32,782,446	23,244,595
Equipment rents—Dr. balance	8,210,850	7,603,690	4,358,513	4,201,692	447,135	456,484	1,219,189	919,930	3,104,503	3,048,552
Joint facility rent—Dr. balance	2,077,653	2,054,857	1,081,875	995,418	99,473	103,070	89,386	65,591	806,919	890,778
Net railway operating income	94,204,116	70,617,893	45,952,112	36,084,845	5,856,410	4,494,871	13,519,570	10,732,912	28,871,024	19,305,265
Ratio of expenses to revenues (per cent.)	73.25	76.60	72.42	75.24	65.91	70.32	71.99	75.22	75.61	79.57

FOR FOUR MONTHS ENDED WITH APRIL, 1929 AND 1928										
Average number of miles operated	241,283.03	240,510.66	59,916.50	59,898.05	5,633.25	5,621.62	40,148.69	40,023.47	135,584.59	134,967.52
Revenues:										
Freight	1,516,620,054	1,429,576,863	668,550,788	619,691,139	78,425,434	71,146,870	204,882,584	200,323,610	564,761,248	538,415,244
Passenger	282,758,443	290,031,750	146,204,935	149,011,878	5,471,922	5,866,163	39,883,216	42,113,863	91,198,370	93,039,846
Mail	38,968,637	31,499,448	14,645,354	11,863,884	962,332	855,867	5,380,522	4,734,997	17,980,429	14,044,700
Express	45,850,640	41,878,753	21,651,926	19,113,036	1,004,695	986,561	6,728,169	6,327,492	16,465,850	15,451,664
All other transportat'n	67,186,371	64,725,919	37,739,402	35,851,351	751,740	757,695	4,348,257	4,173,711	24,346,972	23,943,757
Incidental	39,385,586	36,103,946	20,473,357	18,498,320	1,066,597	1,276,594	4,946,574	4,772,225	12,899,058	11,556,807
Joint facility—Cr.	4,136,475	4,425,141	1,386,784	1,752,400	43,144	53,641	572,106	537,954	2,134,441	2,081,164
Joint facility—Dr.	1,281,987	1,480,469	322,759	527,811	16,911	9,810	119,528	123,623	822,789	819,225
Railway operating revenues	1,993,624,219	1,896,761,351	910,329,787	855,254,197	87,708,953	80,933,581	266,621,900	262,860,229	728,963,579	697,713,344
Expenses:										
Maintenance of way and structures	253,794,371	250,189,516	104,125,218	102,814,380	12,039,803	11,793,108	37,833,021	36,168,959	99,796,329	99,413,069
Maintenance of equipment	398,279,882	389,721,213	190,220,081	181,929,149	18,320,094	18,169,977	50,646,060	52,061,833	139,093,647	137,560,254
Traffic	41,677,774	41,012,667	15,589,858	15,294,530	1,094,620	1,055,972	6,867,646	7,146,346	18,125,650	17,515,819
Transportation	700,123,252	691,752,937	329,893,359	325,869,770	22,316,924	22,498,118	91,168,680	92,743,531	256,744,289	250,641,518
Miscellaneous operat'ns	18,715,809	17,894,739	8,739,919	8,505,874	303,848	341,909	2,307,209	2,376,229	7,364,833	6,670,727
General	64,035,351	64,683,411	27,687,923	28,852,428	2,352,173	2,449,263	8,506,699	8,372,671	25,488,556	25,009,049
Transportation for investment—Cr.	3,370,482	4,358,959	681,905	578,767	43,716	134,118	267,015	370,384	2,377,846	3,275,690
Railway operating expenses	1,473,255,957	1,450,895,524	675,574,453	662,687,364	56,383,746	56,174,229	197,062,300	198,499,185	544,235,458	533,534,746
Net revenue from railway operations	520,368,262	445,865,827	234,755,334	192,566,833	31,325,207	24,759,352	69,559,600	64,361,044	184,728,121	164,178,598
Railway tax accruals	128,101,943	120,123,529	52,152,876	48,494,183	6,933,414	6,692,582	17,658,219	16,948,830	51,357,434	47,987,534
Uncollectible ry. revs.	399,818	434,626	174,140	214,589	8,436	7,126	73,093	62,491	144,149	150,420
Railway operating income	391,866,501	325,307,672	182,428,318	143,858,061	24,383,357	18,059,644	51,828,288	47,349,723	133,226,538	116,040,244
Equipment rents—Dr. balance	29,991,291	29,437,371	16,176,039	16,071,677	42,159,656	42,033,673	3,265,476	3,050,891	12,709,432	12,348,476
Joint facility rent—Dr. balance	8,129,213	7,881,989	4,035,270	4,034,411	428,012	462,864	304,550	155,946	3,361,381	3,228,768
Net railway operating income	353,745,997	287,988,312	162,217,009	123,751,973	26,115,001	19,630,453	48,258,262	44,142,886	117,155,725	100,463,000
Ratio of expenses to revenues (per cent.)	73.90	76.49	74.21	77.48	64.29	69.41	73.91	75.52	74.66	76.47

a Includes \$3,197,255 sleeping and parlor car surcharge. b Includes \$3,197,077 sleeping and parlor car surcharge. c Includes \$13,090,230 sleeping and parlor car surcharge. d Deficit or other reverse items. e Includes \$12,721,832 sleeping and parlor car surcharge.

Compiled by the Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Traffic

The Chicago & Alton, the Missouri Pacific, the Denver & Rio Grande Western and the Western Pacific have established 146-hr. freight service for fruits and vegetables from California to Chicago.

The Interstate Commerce Commission has postponed the argument on western livestock rates, Part 9 of its rate structure investigation under the Hoch-Smith resolution, and related cases, including the eastern livestock cases of 1926, from July 10 to October 1.

The New York Central has established a new fast freight service for fruits and vegetables from Chicago and St. Louis to New York, Boston and intermediate points, providing tenth morning delivery of perishable freight from the Pacific coast at both New York and Boston.

The Ohio Valley Shippers' Advisory Board will hold its 22nd regular meeting at the Brown Hotel, Louisville, Ky., on Tuesday, July 9. S. A. Cash, traffic manager of B. F. Avery & Sons, Louisville, is chairman of the Committee of Arrangements. This organization has 2,456 members.

The Chicago & Alton, on June 15, applied to the Illinois Commerce Commission for permission to discontinue nine local passenger trains on runs between Chicago and Bloomington, Ill.; Roodhouse and Springfield; Roodhouse and Louisiana, Mo.; Carlinville, Ill. and East Hardin; and Jacksonville and Roodhouse. A decided falling off in passenger traffic was the reason advanced.

The passenger route from New York City to Los Angeles over the New York Central, the Universal Aviation Corporation, and the Atchison, Topeka & Santa Fe Railway, which was announced last week, was inaugurated on Friday evening, June 14, a number of passengers starting from New York at 5 p. m. Eastern time. The New York Central has tickets over this route for sale at its ticket offices in New York City.

The Southern Pacific, during a 24-hour period beginning on June 8 moved 58 special Shriner trains from Los Angeles, Cal., to San Francisco. On June 9, 10, and 11, 45 specials were run over the main line from San Francisco to Portland, Oregon. In this group were 34 Shriner specials, a number of extra sections of regular trains for the Rose Festival at Portland and a number of national guard troop trains en route to Camp Clatsop.

The "Blue Comet", the new deluxe coach train with two schedules in each direction daily, was put in service by the Central of New Jersey between New York and Atlantic City last February. An additional "Blue Comet" will now be run from New York to Atlantic City every Friday afternoon starting at 4 p. m., Eastern Standard time. Northbound, the

additional schedule will start from Atlantic City on Sunday at 6:40 p. m. The "Blue Comet" has been on time 99.81 per cent of its trips.

The Chicago, St. Paul, Minneapolis & Omaha has resumed its 16-hr. fast freight service between Omaha, Neb. and the Twin Cities, the service having been discontinued during the war. The train, which before the war was known as "No. 20" is now called the Rob Roy. It leaves Omaha at 9:30 a. m. daily and arrives at St. Paul, 368 miles distant, at 1:30 a. m. carrying, primarily, California fruits and vegetables.

The Chicago & North Western has booked more than 1,400 persons for summer trips to the western parks, California, the Pacific Northwest and Alaska, the largest number ever signed so early in June. Three special tours carrying more than 150 people left Chicago on June 15. A special California tourist train will leave June 22, and on June 29, three cars of people will be carried by the Portland Limited to Portland for Alaska.

The Interstate Commerce Commission has suspended from June 13 until January 13, 1930, the operation of schedules as published in Supplement No. 29 to Agent F. L. Speiden's freight tariff I. C. C. No. 1104 which propose reductions in rates on pig iron from southern producing points to St. Louis, Mo., and intermediate destinations in Indiana and Illinois. The rate from Birmingham, Ala., to St. Louis would be reduced from \$4.42 to \$3.69. Many protests were filed with the Commission by competing railroads and furnace interests.

Announcement is made at New Orleans, La., by "Southern Air Transport" that a passenger air line is to be started this month which, in connection with the Piedmont Limited of the Southern, will take passengers from New York City to New Orleans in less than 24 hours. The Piedmont Limited leaves New York at 3:40 p. m. Eastern time; it is proposed to take passengers from this train the next morning at Greensboro or Charlotte, in North Carolina, and deliver them in New Orleans at 2 o'clock the same afternoon. The Piedmont Limited reaches New Orleans the next morning at 7:20.

The Pennsylvania announces a partial time table and other features of its rail and air route from New York to Los Angeles, beginning on July 7, as follows: Leave New York, 6:05 p. m. on the "Airway Limited"; arrive Port Columbus, Ohio, 8 a. m.; arrive Indianapolis, Ind., one hour later. Leaving Indianapolis, cups of bouillon will be passed around. Arrive St. Louis 12:01 p. m.; leave St. Louis on another ship, on which passengers will be served with a hot (Fred Harvey) luncheon. Leave Kansas City 3:11 p. m.; Wichita, Kan., 5 p. m.; ar-

rive Waynoka, Okla., 6:39 p. m.; leave Waynoka by Atchison, Topeka & Santa Fe train; resume the air journey the next morning at Clovis, N. M., at 8:25; then, stopping at Albuquerque, Winslow and Kingman, arrive at Barstow, 5:51 p. m.; arrive at Los Angeles 6:57 p. m.

Traffic Through Panama Canal

During May 524 commercial vessels and 18 small launches transited the Panama Canal. Tolls on the commercial vessels aggregated \$2,296,546.57, and on the launches, \$179.58, or a total tolls collection of \$2,296,726.15.

Automobiles Taken as Baggage

Automobiles belonging to passengers are now carried in baggage service, under certain conditions, from Cincinnati, Louisville and other Ohio river crossings to Jacksonville, West Palm Beach, Miami and certain other southern points, and vice versa. This is the announcement in Southeastern baggage tariff No. 11, I. C. C., issued by W. H. Howard, Atlanta, Ga., and reprinted in a Southern Railway circular. The automobile is to be sent by freight; it will be loaded and unladed by the carrier, and may be dispatched 96 hours in advance of the day on which the owner starts. Five passenger tickets must be bought for each automobile. The tariff applies also to and from Washington, D. C., and all stations in Florida on the Atlantic Coast Line. There must be two passengers, who apparently must have two tickets in addition to the five bought for the automobile.

Freight Traffic in April

The volume of freight traffic handled by the Class I railroads in April amounted to 38,334,255,000 net ton-miles, according to reports compiled by the Bureau of Railway Economics. This exceeded by 2,447,081,000 net ton-miles or 6.8 per cent the traffic handled in April last year, and was an increase of 3.3 per cent above April, 1927.

In the Eastern district there was an increase of 7.4 per cent, in the Southern 4.6 per cent, and in the Western 6.9 per cent.

The traffic for the first four months in 1929 amounted to 155,887,429,000 net ton-miles, an increase of 8,502,134,000 net ton-miles, or 5.8 per cent, above the corresponding period in 1928.

Railroads in the Eastern district for the four months period reported an increase of 8.7 per cent, while in the Southern district it was 0.6 per cent and in the Western 3.9 per cent.

The average daily movement per freight car in April was 32 miles, the highest for any April on record. This was an increase of 2.1 miles above that for April last year and 2.5 miles above that of two years ago. For the past nine years, there has been a constant increase in the promptness with which freight has been handled by the railroads, with the result that it is now being moved with less delay than ever before. In April 1921, for instance, the average daily movement per freight car was 20.6 miles.

The average speed of freight trains in April was 13.3 miles an hour, an increase

of 0.4 miles above that of April, 1928, and an increase of one mile above that of April two years ago.

The average load per car in April this year was 25.6 tons; the same as that for April 1928 but a reduction of 0.6 ton under the average for April 1927.

Allegheny Advisory Board

The Allegheny Regional Advisory Board held its regular meeting at New Castle, Pa., on June 13. Universal optimism prevailed regarding the outlook in business for the third quarter of 1929. The coal and coke interests, as a whole, estimate an increase of 21 per cent in their car requirements. The operators in eastern Ohio expect to double their shipments; those in Northern West Virginia, 25 per cent. In Pennsylvania the estimate is about 17 per cent in the high volatile field and 3.4 per cent in the low volatile section. In coke, the anticipated increase is 25 per cent.

Decreases are expected in fresh fruits, 5 per cent and in leather and products, 28 per cent; but, taking the average of all commodities, including coal, the net increase over 1928 is expected to be 13.8 per cent.

Of the increases predicted, the larger items are: iron and steel, etc., 5.4 per cent; tin plate, 5.7 per cent; machinery, etc., 8.6 per cent; gravel, sand and stone 8.5 per cent; lime 9 per cent; fertilizer, 7 per cent; and increases of from 10 to 19½ per cent are predicted on a large variety of manufactured goods. The committee on brick and clay products reports increases in some kinds and decreases in others, with a net decrease of about 0.5 per cent in all brick and clay products.

The next regular meeting will be held at Canton, Ohio, on Thursday, September 12.

Export Rates Debated in House

A considerable amount of debate in the house of Representatives has been aroused by resolutions introduced by Representative Howard, of Nebraska, and Representative Jones, of Texas, directing the Interstate Commerce Commission to effect, with the least practicable delay, reductions in freight rates on wheat intended for export "in a similar proportion to the reductions or advantages which now apply to manufactured iron and steel articles when intended for export over the rates applying on such articles of iron and steel when intended for domestic use." The Jones resolution is similar to that of Mr. Howard except that it includes cotton as well as wheat.

The resolutions were referred to the committee on interstate and foreign commerce, which had not been organized for the special session, and Representative Howard then tried unsuccessfully to have it referred to the committee on agriculture. During the discussion Representative Denison, of Illinois, spoke on several occasions, to point out that the commission does not make the rates in the first place and that such reductions as have been made in export freight rates below the domestic rates have been made by the railroads themselves, so they cannot be

described, as Representative Howard implied, as a government subsidy to the industries that enjoy them. On June 18, after some inquiry from the commission Representative Denison made a speech in which he pointed out that if the resolutions had been passed the commission would have had to increase export rates on farm products in many instances, rather than decrease them, because so many export rates on farm products have been reduced below the domestic rates more than have the rates on iron and steel. Mr. Denison also put into the Congressional Record a long letter from Commissioner Porter stating that even the standard export rates on wheat, speaking generally, probably average as much as 25 per cent lower than the domestic rates, and that the present temporary export rates, put in at the request of the President, probably do not exceed 55 per cent of the domestic rates from and to the same points. He also pointed out that for many years export rates on grain on the average have been below the corresponding domestic rates to a considerably greater extent than has been true of most other commodities, and called attention to the fact that the entire structure of grain rates in the West and for export is now before the commission for decision.

"As a matter of fact, Commissioner Porter said, "with the exception of grain, iron and steel articles, automobiles, agricultural implements, and a few other commodities, there is not now and never has been any general basis of export rates lower than the domestic rates made for the purpose of encouraging exportation. It should not be inferred from this statement that there have not for a great many years been many export rates that were lower than the domestic rates from and to the same points. But such rates in practically all instances resulted not from any attempt to make rates to encourage exportation of the commodities affected, but solely to permit movement through various ports on a comparative equality of rates. In other words, the underlying purpose of practically all export rates, except on the four commodities above mentioned, has not been to create rates lower than the domestic rates, but to equalize one port with another so that traffic from a given point of origin in the United States may be exported through more than one port instead of being confined to the port to which the domestic rate is the lowest. To put it another way, the export rates, except those indicated, especially to Gulf ports, have generally been constructed by determining the lowest domestic rate from a given point of origin to any port and applying either that same rate or a rate made differentially higher to other ports for the purpose of creating more than one route for the movement of traffic."

Congress adjourned on June 19, the Senate until August 19 and the House until September 23. No general railroad legislation has been considered in the Senate during the special session and in the House all bills were referred to the committee on interstate commerce which was not organized.

Equipment and Supplies

Locomotives

THE WABASH is inquiring for 25 locomotives of the 2-8-2 type.

THE BANGOR & AROOSTOOK has ordered four 4-8-2 type locomotives from the American Locomotive Company. These locomotives will have 22½ by 30-in. cylinders and a total weight in working order of 300,000 lb. Inquiry for this equipment was reported in the *Railway Age* of June 8.

Freight Cars

THE CITIES SERVICE TANK LINE, New York, is inquiring for four tank cars of 4000 gal. capacity with two compartments.

THE NATIONAL LEAD COMPANY, New York, is inquiring for one tank car of 10,000 gal. capacity.

THE CENTRAL ALLOY STEEL COMPANY has ordered one 30-yd. rolling trunnion type air dump car from the Koppel Industrial Car & Equipment Company.

THE SEABOARD AIR LINE has given a contract to the Richmond Car Works for converting 300 plain gondola cars into hopper bottom cars.

THE NEW YORK, NEW HAVEN & HARTFORD is inquiring for from one to 50 brick cars with hopper bottom, of 70 tons' capacity.

THE CHICAGO, ROCK ISLAND & PACIFIC has ordered 300 gondola car bodies of 50 tons' capacity from the Bettendorf Company. Inquiry for this equipment was reported in the *Railway Age* of May 18.

THE AMERICAN SHEET & TIN PLATE COMPANY has ordered one 30 yd. rolling trunnion type air dump car from the Koppel Industrial Car & Equipment Company.

A. GUTHRIE & COMPANY has ordered six 30-yd. rolling trunnion type air dump cars from the Koppel Industrial Car & Equipment Company.

THE YOUNGSTOWN SHEET & TUBE COMPANY has ordered two 30-yd. rolling trunnion type air dump cars from the Koppel Industrial Car & Equipment Company.

THE BOSTON & MAINE has ordered 1000 box cars from the Standard Steel Car Company. In the *Railway Age* of June 8 it was reported that this road contemplated buying 500 box cars.

THE DELAWARE, LACKAWANNA & WESTERN is inquiring for prices on 1,000 box cars of 55 tons' capacity bids to be for both steel underframe construction and for all-steel construction. Bids are also wanted on 250 steel hopper bottom coal cars of 70 tons' capacity.

Passenger Cars

THE DELAWARE, LACKAWANNA & WESTERN is inquiring for two steel combination mail and baggage cars.

THE CHICAGO & NORTH WESTERN has ordered five steel horse cars 70 ft. long from the American Car & Foundry Company. Inquiry for this equipment was reported in the *Railway Age* of May 18.

THE MINNEAPOLIS & ST. LOUIS is inquiring for three passenger, baggage and mail, gas electric rail motor cars. Through a typographical error the name of the company was reported as the Minneapolis & St. Paul in the *Railway Age* of June 15.

THE DELAWARE, LACKAWANNA & WESTERN is now asking for bids on 141 new multiple unit coaches and bids are also being asked for the reconstruction of 141 of its present modern steel coaches which are to be converted into trailer cars. In the *Railway Age* of June 8 it was reported that inquiries would be sent out for the above equipment in the near future.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered the following equipment:

No.	Type	Builder
70	coaches	Osgood Bradley Car Company
24	smoking cars	Osgood Bradley Car Company
6	smoker baggage cars	Osgood Bradley Car Company
10	baggage and mail cars with 30-ft. compartment	Bethlehem Steel Company
5	baggage and mail cars with 15-ft. compartment	Bethlehem Steel Company

Inquiry for this equipment was reported in *Railway Age* of May 18 and May 25.

Machinery and Tools

THE NEW YORK CENTRAL is inquiring for two 25-ton locomotive cranes.

Signaling

THE CANADIAN PACIFIC has contracted with the Union Switch & Signal Company for the installation of automatic block signals—semaphore, type T-2—between Maple Creek, Sask., and Dunmore, Alberta, 59 miles, single track.

THE PENNSYLVANIA has ordered from the Union Switch & Signal Company 75 position-light signals, 94 relays, 90 hand-operated switch mechanisms, 117 copper oxide rectifiers and other material, to be installed on its Williamsport division between Selinsgrove Junction, Pa., and Rockville, 43 miles, double track.

G. R. S. Dispatching System on C. P. R.

The Canadian Pacific has ordered from the General Railway Signal Company material for the installation of the G. R. S. dispatching system at Three Rivers, Quebec. At this place, there is a large amount of switching to and from industries, connected at numerous points with the main line, and in the new system the movement of trains at four points will be recorded automatically in the operator's cabin. The operator will control seven switches and 11 signals. All locking will be accomplished directly between the functions and not through lever locks.

Supply Trade

New Officers of American Brake Shoe & Foundry Company

Joseph B. Terbell, chairman and president of the American Brake Shoe & Foundry Company, New York, has relinquished the duties of president, remaining as chairman of the board and as active executive head of the organization. William B. Given, Jr., vice-president, has been elected president, with headquarters at New York, and Thomas

partment in May, 1919, and since January, 1921, served as vice-president with headquarters at New York.

Thomas Finigan who has been elected first vice-president has also had his jurisdiction extended over various company activities. He was born at Paterson, N. J., on September 26 1882. In 1897, he entered the mechanical department of the



Joseph B. Terbell



William B. Given, Jr.

Finigan, vice-president, has been elected first vice-president, with headquarters at Chicago.

Joseph B. Terbell was born at Corning, N. Y., in February 1863 and was graduated from Hamilton College in the class of 1884 with the degree of A. B. He subsequently served with the Fall Brook Railroad, now part of the New York Central, and later was vice-president of the Corning Iron Works. In 1897 he became president of the Corning Brake Shoe Company and in 1902 was elected vice-president of the American Brake Shoe & Foundry Company, with headquarters at Chicago, in charge of the company's western business. He subsequently served as vice-president at New York. In July, 1919, he was elected president to succeed William G. Pearce, who retired, and in March, 1922, at the time of the death of Otis H. Cutler, Mr. Terbell became also chairman of the board.

William B. Given, Jr., was born on December 7, 1886, at Columbia, Pa., and was graduated from Sheffield Scientific School (Yale) in 1908. Mr. Given began work in the banking business in 1908 and three years later entered the service of the American Brake Shoe & Foundry Company as secretary to the president. In 1916 he became assistant to the president and in May of the following year joined the United States Army and served abroad as captain in the 165th Regiment of the Rainbow division. He returned to the American Brake Shoe & Foundry Company as assistant vice-president of the sales de-

Consolidated Traction Company at Newark, N. J. (now the Public Service Coordinated Transport) and later became assistant master mechanic, which position he held until 1902, when he entered the mechanical department of the United Railways at San Francisco, Cal. In 1906, he was in charge of rehabilitation work following the earthquake. Subsequently,



Thomas Finigan

he served as purchasing agent and assistant general manager, which position he held until 1915, when he resigned to become Pacific Coast manager of the American Brake Shoe & Foundry Company, with headquarters at San Francisco. In 1918, he was elected vice-president at Chicago, which position he has held until his recent election. In 1920, he was also elected president of the American Brake

Shoe & Foundry Company of California, and in 1927, president of the American Brake Materials Corporation. Besides being a director in these latter three companies, he is a director in the following subsidiaries: The American Malleable Company, The American Manganese Company, The Southern Wheel Company, the American Forge Company and the Ramapo—Ajax Corporation.

The Celotex Company has moved its offices to 919 No. Michigan avenue, Chicago.

W. G. Hume, formerly general sales manager of the **Keystone Steel and Wire Company**, Peoria, Ill., has been elected vice-president of the Northwestern Barb Wire Company, Sterling, Ill.

The Copperweld Steel Company, Glassport, Pa., has formed a southeastern district comprised of Georgia, Alabama, Tennessee, Florida, Mississippi, and part of Louisiana, with **P. A. Terrell** in charge as district manager and office in the American Traders Bank building, Birmingham, Ala.

The Buda Company, Harvey, Ill., has given a contract to the Austin Company, Cleveland, Ohio, for preparing the design and the construction of a new \$25,000 inspection and storage building. The building will be of one-story, steel-frame construction.

The Fafnir Bearing Company, New Britain, Conn., manufacturers of ball bearings, will enter into the railway equipment field through the recent purchase of the **Railway Motors Corporation**, De Pere, Wis., who have been for many years the makers of the Melcher railway roller journal bearing, which has been in use on a number of railroads in the West and Middle West for some time. The Fafnir Bearing Company will manufacture the Melcher box; for the present the manufacture will be conducted at the Railway Motors Corporation plant at De Pere but production will ultimately be concentrated in New Britain. **L. W. Melcher**, designer of the bearing, will continue to have charge of sales and service with headquarters at Chicago. The Fafnir Bearing Company has been specializing in bearing productions since 1911.

A. M. Mueller, who has been associated with **Joseph T. Ryerson & Son, Inc.**, Chicago, for 30 years in the accounting and sales departments, has been elected assistant secretary and member of the board of directors. Mr. Mueller was manager of the St. Louis plant from 1914 to 1917 and later general manager of sales. **H. B. Ressler** succeeds Mr. Mueller as general manager of sales. Mr. Ressler has served for 25 years as manager of the mill order department and manager of the St. Louis plant. **Robert C. Ross** has been promoted from general traffic manager to assistant to the president in charge of plant operations. This will combine all operating and service functions under one head and make for better service with econ-

omy. Mr. Ross has 26 years experience in the operating service and traffic departments. From 1923 to 1929 he was chairman of the Midwest Shippers Advisory Board. **Wm. H. Bryant**, for 23 years in the service of the Ryerson Company, becomes Chicago sales manager in charge of country and city store sales. He was formerly assistant manager of sales in charge of the Chicago country territory. **Guy H. Rumpf**, formerly manager of plant operations, succeeds Mr. Ressler as manager of the St. Louis plant. He has been with the company for 17 years. **Harry W. Treleaven**, who has been with the firm for 20 years has been elected assistant treasurer and will continue to be responsible for office management. President Edward L. Ryerson, Jr., announces that the increase in the number of plant and departments and the growing diversity of products and markets has made it desirable to add to the executive staff.

Philip X. Rice, electrical engineer of the **Miller Train Control Corporation**, has been appointed chief engineer of that company, with headquarters at Stanton, Va. **James Hesser**, who has been connected with the Miller Train Control Corporation since 1928, has been appointed assistant chief engineer. Mr. Rice graduated from the University of Arkansas in 1916, receiving the professional degree of electrical engineer from that university in 1922 and the degree of master of science in railway mechanical engineering from Pennsylvania State College in 1923. In 1913 he became connected with the General Railway Signal Company on signal construction and until 1917 he was engaged in automatic signal construction on the Northern Pacific and in circuit work on the Brooklyn Rapid Transit and the New York Municipal subway. During the World War Mr. Rice was attached to the British Light Railway force, later being transferred to the general headquarters of the United States Army. In 1921 he was appointed instructor in railway electrical engineering and also engaged in refrigerator car research at Pennsylvania State College. He has been associated with the Miller Train Control Corporation since 1923. Mr. Hesser graduated from the Washington (D.C.) Technical High School in 1924 and received the degree of bachelor of electrical engineering from Johns Hopkins University in 1928.

Joshua S. Logan, who has been elected president of the **National Lumber & Creosoting Company**, Texarkana, Ark. Tex., was born on December 16, 1894, at El Paso, Tex. After graduating from Culver Military Academy and attending Washington University, where he studied chemical engineering, Mr. Logan entered the service of the United States Army in April, 1917. During the World war he held the commission of first lieutenant with about six months of the service in France. Upon being discharged from the army in 1919 he was employed in the chemical department

of the Texas Company at its refineries in southeast Texas. In 1923 he became a chemist at the Houston, Tex., plant of the National Lumber & Creosoting Company, then later being advanced to assistant to the manager of the Kansas



Joshua S. Logan

City, Mo., plant and to superintendent of the Houston office and plant. Since 1927 Mr. Logan had been assistant to the president, with headquarters at Texarkana.

Obituary

Page Harris, vice-president of the National Lumber & Creosoting Company, Texarkana, Ark., died at Houston, Tex., on June 18.

Trade Publications

NEW CEMENT PLANT.—In a four-page folder issued by the Ashgrove Lime & Portland Cement Company, Omaha, Neb., announcement is made of the completion of an entirely new plant of that company at Louisville, Neb. This announcement calls attention to the convenience of the location, the larger capacity afforded and the use in this plant of the latest type of cement making equipment. Attention is directed also to the fact that this company, in addition to manufacturing standard cement under the name of Ashgrove cement, also manufactures a high-early-strength Portland cement marketed under the name of Quikard cement.

CONCRETE HARDENER.—The Master Builders' Company, Cleveland, Ohio, has issued an attractive catalogue of 27 pages, entitled "The Fifth Ingredient," which includes a well-illustrated discussion of deterioration in concrete floors, and of the methods which have been developed to overcome these factors. The catalogue announces special discoveries made by the Master Builders' Company, and a large number of graphs and photographs are used to show the results which have been secured through the use of the new fifth ingredient, which is known as "Omicron."

Construction

CANADIAN PACIFIC.—The Canadian Board of Railway Commissioners has ordered this company to proceed with the construction of a tunnel connection at Vancouver, B. C., between its main line and Falls creek yards, which will eliminate grade crossings at Alexander, Columbia, Powell, Cordova, Carrall, Hastings and Pender streets. It is estimated the cost of this project, which involves the driving of a tunnel, 4,600 ft. long, would be about \$1,720,000. The cost would be apportioned between the Canadian Pacific, the British Columbia Electric and the City of Vancouver.

CHICAGO, ROCK ISLAND & PACIFIC (St. Paul & Kansas City Short Line).—A contract has been let to the Clinch-Mitchell Construction Company, Chicago, for the construction of a new line between Coburn, Mo., and a point near Nettleton, about 18 miles. This contract covers grading, bridging, track construction, fencing and buildings and represents about one-third of the line which it is planned to construct between Coburn and a point near Kansas City.

DELAWARE, LACKAWANNA & WESTERN.—This company plans the elimination of a highway grade crossing on its line about a mile north of Chadwicks station in the town of New Hartford, N. Y.

LONG ISLAND.—By an order of the New York Public Service Commission this company has been authorized to proceed with its work of eliminating six grade crossings along its right of way. The crossings effected are as follows: South country road, west of Hampton Bays station, Southampton, to cost \$66,649; South Road, west of Greenport station, town of Southold, to cost \$7,524; Jericho turnpike in the town of Oyster Bay, to cost \$16,700; St. James road and Nissequogue road, two miles east of Smithtown station, to cost \$22,594; South Country road east of East Moriches station, town of Brookhaven, to cost \$23,749; Broad Hollow road in the town of Babylon, to cost \$7,535.

LOUISVILLE & NASHVILLE.—A contract for the grading and placing of culverts for the construction of a branch line, 8 miles in length, from Fox Ridge, Ky., has been awarded to the F. W. Graham Company, Pineville, Ky. The new line will tap timber lands in the vicinity of the Left Fork of Straight Creek.

MISSOURI PACIFIC.—The Interstate Commerce Commission has authorized the San Antonio, Uvalde & Gulf, a subsidiary of this company, to construct a branch line from Brundage, Tex., southward 47 miles; estimated cost \$61,669.

NEW YORK, PITTSBURGH & CHICAGO.—As the result of recent correspondence between the Interstate Commerce Commission and L. F. Loree, representing this company, the commission has consented to continue to hold in suspense until No-

vember 1 this company's application for a certificate authorizing the construction of a new line across the state of Pennsylvania from Easton to Allegheny, with branches. The application was filed in 1925 but proceedings were suspended in 1926 for further hearing, after argument had been heard on a report proposed by examiners for the commission recommending that the application be denied without prejudice to later resubmission. Upon inquiry from the commission as to whether the applicant desired to proceed or whether the case should be dismissed Mr. Loree stated that new surveys were being made and further time was asked in which to present additional facts.

PENNSYLVANIA.—Plans have been filed with the authorities at Jersey City, N. J., for the construction of a large storage warehouse, the first unit of this company's \$50,000,000 ship-rail terminal to be built in that city. The warehouse, a 12-story structure, will cover an area of two city blocks in the space between the present terminal of the Erie and the Old Morris canal bed. It is expected that a call for bids will be sent out within the next few weeks for this building. Adjacent to the warehouse and extending into the North river, the Pennsylvania plans the construction this year of three 1,000 ft. piers. Details of this terminal project were announced in the *Railway Age* of May 11.

PENNSYLVANIA.—This company has awarded contracts as follows: To the Vare Construction Company, Philadelphia, Pa., for the erection of catenary bridges, catenary system, track bonding and the installation of necessary electrical equipment including sub-station foundations in connection with electrification between Philadelphia and Trenton, N. J., to cost approximately \$2,000,000; to the same company for the construction of concrete foundations and guy anchors for catenary supporting structures in connection with electrification between Liddonfield, Pa., and Trenton, N. J., to cost about \$600,000; to T. J. Foley Company, Pittsburgh, Pa., for the construction of an overhead bridge to eliminate a highway grade crossing at Industry, Pa., to cost about \$110,000; to W. V. Pangborne & Company, Philadelphia, Pa., for installation of electrical equipment for the joint Pennsylvania-Lehigh Valley bridge over Newark Bay, at an estimated cost of \$82,000; and another contract to T. J. Foley Company for the construction of an undergrade bridge to eliminate a highway grade crossing at Hoopestown, Pa.; to cost about \$25,000.

QUANAH, ACME & PACIFIC.—Examiner Sullivan of the Interstate Commerce Commission has recommended that the commission grant this company's application for authority to build a new line between Quanah and Acme, Tex., and to abandon operation under trackage rights over the Fort Worth & Denver City between those points.

ST. LOUIS SOUTHWESTERN.—This company closes bids on June 25 for the construction of a new line between Gideon, Mo., and Deering, 20 miles, and the rehabilitation of the Gideon & North Island between Gideon and Malden, 9 miles. The latter project involves the placing of 589,000 cu. yd. of embankment.

SAN LUIS VALLEY SOUTHERN.—Bids will be received until July 5 for the construction of an extension from Jaroso, Colo., to Questa, N. M., 18.5 miles. The contract will include the construction of bridges, culverts, station buildings, water tanks, pumping plants and an engine house, track laying and surfacing and the supplying of all materials needed in construction.

Village Asks Elimination Of N. Y. C. Crossings

A petition has been filed with the New York Public Service Commission by the Village of Herkimer, N. Y., requesting the elimination during the ensuing calendar year of seven existing grade crossings of the New York Central in that village. The crossings in the petition are located at Caroline, Main, Belling, Washington, Prospect and King streets and Protection avenue. The cost of the elimination of each crossing has been estimated at \$70,000, or a total of about \$500,000 for the entire project.

Board of Estimate Approves New York West Side Improvement

The New York Board of Estimate has approved the plans and form of contract for the West Side improvement project in New York City, which carries with it the elimination of the grade crossings of the New York Central on Manhattan Island. The original agreement and plan was submitted by the railroad to the board late in January. Since that time both the board and railroad engineers have held conferences in order to reach an agreement both as to features of the enlarged plan and the transfer of properties between the city and the railroad. At the present time all property rights involved have been appraised and work on the project itself is awaiting approval by the New York Transit Commission.

In the final agreement reached in the transfer of properties the railroad is given a credit of \$3,943,946 and the city of \$9,884,093, giving the city a balance in credit over the railroad of \$5,940,147. The city's plans for park and recreational features, which have to some extent held up the adoption of the agreement, have been referred to a special committee, which is to report to the next meeting of the Board of Estimate on June 27, by which time it is hoped the entire plan will have been adopted by the Transit Commission. Should the sanction of the latter commission be given within the next few weeks, it is expected that work on the project will be started early in the Fall. Six years has been set as the time limit for completion of the entire project according to the agreement.

Railway Finance

ATCHISON, TOPEKA & SANTA FE.—Lease of K. C. & O.—The Interstate Commerce Commission has authorized this company to acquire control by lease of the Kansas City, Mexico & Orient and has authorized the Panhandle & Santa Fe to acquire control by lease of the K. C. M. & O. of Texas and to operate under trackage rights over the line of the K. C. M. & O. between Altus, Okla., and the Texas-Oklahoma state line, 13 miles. The commission had previously authorized the Santa Fe to acquire control of the Orient by purchase of its stock. Under the leases it will operate the lines of the Orient while the Panhandle will operate the lines in Texas and that mentioned in Oklahoma.

CHARLESTON & WESTERN CAROLINA.—Bonds.—The Interstate Commerce Commission has authorized this company to procure the authentication and delivery of \$1,919,000 of its first and consolidated mortgage, series B, 50-year bonds to be held in its treasury in reimbursement for capital expenditures.

CHESAPEAKE & OHIO.—Unification Proceedings.—The Interstate Commerce Commission has permitted the Manufacturers' Association of Chicago Heights, Ill., and the city of Norfolk, Va., to intervene as parties to this company's application for authority to acquire control of railroads in eastern territory.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Bonds.—The Interstate Commerce Commission has authorized this company to issue \$24,000,000 of 4½ per cent refunding and improvement mortgage bonds, series E, \$15,000,000 of these bonds to be used to retire an equal amount of its Series A bonds and the remaining \$9,000,000 to be issued to reimburse the company's treasury in part for uncanceled expenditures for additions and betterments. The bonds will be dated January 1, 1927, and will mature 50 years thereafter. It is stated that no binding arrangement has been made for the sale of the bonds, but that negotiations are in process with J. P. Morgan & Co. for their sale at a net price of not less than 90, which would make the annual cost to the company approximately 5.056 per cent.

CHICAGO & NORTHWESTERN.—Equipment Trust Certificates.—The Interstate Commerce Commission has authorized this company to assume obligation and liability in respect of \$3,971,000 of its 1925 equipment trust certificates, series Q, bearing interest at the rate of 4½ per cent and maturing in 11 annual installments, to be sold at 97.

ERIE.—Equipment Trust.—This company has applied to the Interstate Commerce Commission for authority for an issue of \$8,370,000 of 4½ per cent equipment trust certificates, to be sold at competitive bidding.

ESQUIMALT & NANAIMO.—New Director Elected.—H. E. Beasley, formerly gen-

eral superintendent of this company, has been elected a member of the board of directors.

GREAT NORTHERN.—New Director Elected.—Thomas A. Marlow, president of the National Bank of Helena, Mont., and a partner of McNamara & Marlow, a cattle and merchandising firm, has been elected a member of the board of directors of this company.

GREAT NORTHERN.—Equipment Trust Certificates.—The Interstate Commerce Commission has authorized this company to assume obligation and liability, as guarantor, with the Western Fruit Express in respect of \$1,350,000 of 4½ per cent equipment trust certificates, series D of 1929, of the latter company. The issue will mature from 1930 to 1944. It was sold to the highest bidder, a syndicate headed by the Bankers Company of New York, the Continental Illinois Company and Evans, Stillman & Company at 94.257, making the average annual cost to the company, 5.443 per cent.

INDIANA HARBOR BELT.—Annual Report.—The annual report of this company for 1928 shows net income after interest and other charges of \$2,927,269, as compared with net income of \$1,356,213 in 1927. Selected items from the income statement follow:

INDIANA HARBOR BELT			
	1928	1927	Increase or Decrease
Average mileage operated	130.24	130.46	— .22
RAILWAY OPERATING REVENUES	12,722,744	11,435,824	1,286,951
Maintenance of way	1,170,174	1,659,975	—489,801
Maintenance of equipment ..	1,328,370	1,713,117	—384,747
Transportation	4,892,926	4,662,144	230,782
TOTAL OPERATING income	4,049,016	2,359,305	1,689,712
Operating ratio	62.15	74.52	—12.37
NET REVENUE FROM OPERATIONS	4,815,340	2,914,179	1,901,161
Railway tax accruals	758,236	552,846	205,389
Railway operating income	4,049,016	2,259,305	1,689,712
Equipment rents—Net Dr.	386,145	289,816	96,329
Joint facility rents—Net Dr.	391,727	319,844	—71,883
NET RAILWAY OPERATING INCOME	3,361,144	1,749,645	1,611,499
Non-operating income	95,162	81,583	13,579
GROSS INCOME	3,456,306	1,831,228	1,625,078
Rent for leased roads	29,625	28,533	1,093
Interest on funded debt ..	453,420	471,288	—17,869
TOTAL DEDUCTIONS FROM GROSS INCOME	529,037	475,015	54,022
NET INCOME	2,927,269	1,356,213	1,571,056

NEW YORK, CHICAGO & ST. LOUIS.—Equipment Trust.—This company has applied to the Interstate Commerce Commission for authority for an issue of \$2-

400,000 of 4½ per cent equipment trust certificates, to be sold on competitive bids.

NEW YORK, CHICAGO & ST. LOUIS.—Lease.—This company has applied to the Interstate Commerce Commission for authority to acquire and operate under lease the railroad yard of the Northern Ohio Food Terminal, Inc., which has been organized for the purpose of providing a wholesale market district at Cleveland, Ohio.

PENNSYLVANIA.—Stock Subscription.—This company has announced that the voting trust certificates representing its stock have been fully subscribed, thus making available \$87,000,000 for investment in various transportation enterprises. The trustees are directors of the Pennsylvania Railroad.

PENNSYLVANIA.—Acquisition of Baltimore Terminal Property.—This company is reported to have acquired the railroad terminal properties of the Canton Company in Baltimore, Md. This report has not been officially confirmed.

READING.—Allentown Terminal Bonds.—The Interstate Commerce Commission has authorized the Allentown Terminal, which is leased and operated by the Central of New Jersey and the Reading, to extend from July 1, 1929, to July 1, 1955, the maturity of \$450,000 of its first mortgage bonds. The bonds matured on July 1, 1919, prior to which they bore interest at the rate of 4 per cent. At that time maturity was extended to 1929, and the interest rate increased to 6 per cent. Under the terms of the present extension the interest rate will be 4½ per cent.

SEABOARD AIR LINE.—Extension of Maturity of G. C. & N. Bonds.—The Interstate Commerce Commission has authorized this company to extend the time of payment of \$5,360,000 of Georgia, Carolina & Northern first mortgage bonds from July 1, 1929, when they mature, until five years hence, increasing the interest rate from 5 per cent to 6 per cent.

ST. LOUIS-SAN FRANCISCO.—Annual Report.—The annual report of this company for 1928 shows net income after interest and other charges of \$8,216,507, as compared with net income of \$7,464,236 in 1927. Selected items from the income statement follow:

ST. LOUIS-SAN FRANCISCO			
	1928	1927	Increase or Decrease
Average mileage operated	5,673.11	5,605.24	67.87
RAILWAY OPERATING REVENUES	85,782,818	89,259,584	—3,476,767
Maintenance of way	10,604,109	11,910,297	—1,306,188
Maintenance of equipment ..	12,922,659	13,697,915	—775,256
Transportation	28,942,184	29,628,234	—686,050
TOTAL OPERATING EXPENSES ..	59,783,801	62,263,277	—2,479,476
Operating ratio	69.69	69.76	— .07
NET REVENUE FROM OPERATIONS	25,999,017	26,996,307	—997,290
Railway tax accruals	5,212,202	4,992,531	219,671
Hire of equipment—Net ..	342,136	171,630	170,505
Joint facility rents—Net ..	148,217	129,962	18,254

NET RAILWAY OPERATING INCOME			
Operating income	20,969,445	22,023,459	1,054,014
Non-operating income	3,778,629	1,530,294	2,248,334
GROSS INCOME	24,748,074	23,553,753	1,194,321
TOTAL DEDUCTIONS FROM GROSS INCOME			
	111,645	577,754	466,109
NET INCOME	8,216,507	7,464,235	752,272
Disposition of net income:			
Dividends on pfd. stock	1,012,164	428,022	584,142
Dividends on com. stock	5,234,092	4,352,229	881,863
Balance	1,970,251	2,683,985	713,733

TEXAS & PACIFIC.—Equipment Trust Certificates.—The Interstate Commerce Commission has authorized this company to assume obligation and liability in respect of \$2,685,000 of its 4½ per cent equipment trust certificates, series C, to mature in equal annual installments from 1930-1944. The issue was sold to the highest bidder, a syndicate made up of the Harris Trust & Savings Bank and the First Union Trust & Savings Bank of Chicago, the price being 94.55, making the average cost to the company 5.409 per cent.

ULSTER & DELAWARE.—Annual Report.—The annual report of this company for 1928 shows net deficit after interest and other charges of \$76,581, as compared with net deficit in 1927 of \$106,334. Selected items from the income statement follow:

ULSTER & DELAWARE			
	1928	1927	Increase or Decrease
RAILWAY OPERATING REVENUES			
Maintenance of way	192,664	211,550	—18,886
Maintenance of equipment	182,287	186,534	—4,247
Transportation	549,895	581,655	—31,760
TOTAL OPERATING EXPENSES	994,561	1,059,774	—65,213
NET REVENUE FROM OPERATIONS	177,874	151,794	26,080
Railway tax accruals	68,250	69,200	—950
Railway operating income	109,471	82,594	26,877
Hire of freight cars—Net Dr.	39,156	40,768	—1,612
Joint facility rents—Net Cr.	61	60	1
Non-operating income	20,990	21,697	—707
GROSS INCOME	130,461	104,291	26,170
Interest on funded debt	140,000	140,000	.....
TOTAL DEDUCTIONS FROM GROSS INCOME			
	207,042	210,625	—3,583
NET INCOME (Deficit)	76,581	106,334	—29,753

WABASH.—Unification Proceedings.—The Interstate Commerce Commission has granted this company's application for permission to intervene as a party to the proceedings on the applications filed by the Baltimore & Ohio and the Chesapeake & Ohio for authority to acquire control of various roads in eastern territory in general accord with the "four-system" plan. Hearings in these cases are now proposed to be held in the Fall. The Wabash has filed various petitions with the commission, stating that it proposes to present to the commission shortly

an application of its own proposing the creation of an independent system or systems in eastern territory which would include the Wheeling & Lake Erie, and the Western Maryland, now included in the proposals of the C. & O. and the B. & O. The Wabash itself is also included in the B. & O. application. The Wabash also had asked the commission to re-open the proceedings on its tentative consolidation plan of 1921 so as to consider together the various proposals, including that to be presented by the Wabash, and also those of the B. & O., C. & O., Pittsburgh & West Virginia (which has applied for authority to acquire control of the W. & L. E. and also the Western Maryland), and the New York, Chicago & St. Louis, which has applied for authority to acquire control of the W. & L. E. The Wabash averred in its petitions that the plans of the Baltimore & Ohio and Chesapeake & Ohio are the result of an illegal agreement with the New York Central and certain individuals for the purpose of preventing the formation in trunk line territory of independent competitive systems, referring to the finding by the commission that acquisition of stock of the W. & L. E. by the three trunk lines was in violation of the Clayton act. The Commission announced on June 17 that it had denied the petition for a re-opening and

further hearings on the tentative consolidation plan.

WESTERN FRUIT EXPRESS.—See Great Northern.

Dividends Declared

Canada Southern.—1½ per cent, payable August 1 to holders of record June 28.
Chicago, Indianapolis & Louisville.—Common, 2½ per cent; Common Extra, 1 per cent; Preferred, 2 per cent, all payable July 10 to holders of record June 24.
Cincinnati Northern.—5 per cent, semi-annually, payable July 20 to holders of record July 12.
Cleveland, Cincinnati, Chicago & St. Louis.—Common, 2 per cent, quarterly; Preferred, 1¼ per cent, quarterly, both payable July 20 to holders of record June 28.
Joliet & Chicago.—1¼ per cent, quarterly, payable July 1 to holders of record June 21.
Michigan Central.—\$20, payable July 29 to holders of record June 28.
New York Central.—2 per cent, quarterly, payable August 1 to holders of record June 28.
Pittsburgh & Ft. Wayne & Chicago.—Common, 1¼ per cent, quarterly; Preferred, 1¼ per cent, quarterly, both payable July 2 to holders of record June 10a.
Pittsburgh & Lake Erie.—\$2.50, payable August 1 to holders of record June 28.
Rensselaer & Saratoga.—4 per cent, payable July 1 to holders of record June 15a.
Southern.—Common, 2 per cent, quarterly, payable August 1 to holders of record July 1; Preferred, 1¼ per cent, quarterly, payable July 15 to holders of record June 24.

Average Prices of Stocks and of Bonds

	June 18	Last week	Last year
Average price of 20 representative railway stocks	137.28	134.37	115.49
Average price of 20 representative railway bonds	90.26	90.33	94.28

Railway Officers

H. B. Voorhees Succeeds F. C. Batchelder

Frank C. Batchelder, who retired on June 15 as vice-president and executive representative of the Baltimore & Ohio and president of the Baltimore & Ohio Chicago Terminal, with headquarters at Chicago, has been succeeded by H. B.

that point began his railroad career on December 13, 1873, as a telegraph operator on the Chicago, Milwaukee & St. Paul. For the following 15 years he was employed on the Milwaukee in that capacity and as agent, train dispatcher and



Frank C. Batchelder



H. B. Voorhees

Voorhees, who was general manager of the Baltimore & Ohio, western lines, at Cincinnati. Mr. Batchelder's retirement on June 15, represents the completion of a period of almost 56 years of railway service. He was born at Fall River, Wis., on May 27, 1857, and after attending the country and district schools at

chief dispatcher and in February, 1888, he became a dispatcher on the Minneapolis, St. Paul & Sault Ste. Marie. Mr. Batchelder advanced on that road to assistant superintendent and then to superintendent of the Wisconsin & Peninsula division. His service with the Baltimore & Ohio began on July 1, 1899, when he

was appointed superintendent at Garrett, Ind. Later he was transferred to Newark, Ohio; was promoted to general superintendent at Baltimore, Md., and next was transferred to Chicago. In 1912 he was promoted to assistant to the president at Chicago, being elected vice-president and executive representative in Chicago, on October 31, 1915. In addition, Mr. Batchelder was vice-president of the B. & O. C. T., from April 1, 1910 to April 11, 1912, and president of that company from the latter date until his retirement.

H. B. Voorhees, who has been elected vice-president and executive representative of the Baltimore & Ohio and president of the Baltimore & Ohio Chicago Terminal, with headquarters at Chicago, has completed 33 years of railway service nearly 28 of which have been with the B. & O. He was born on January 22, 1876, and graduated from Rensselaer Polytechnic Institute in 1896. In the same year he became an assistant supervisor on the Philadelphia & Reading (now the Reading) at Tamaqua, Pa., and for the following five years he served with the Reading in that capacity and as supervisor, as assistant trainmaster at Williamsport, Pa., and Philadelphia, and as trainmaster at Reading, Pa. Mr. Voorhees started his service with the Baltimore & Ohio on December 1, 1901, as an assistant engineer at Pittsburgh, Pa. The following year he was promoted to division engineer at Baltimore, Md., and on September 1, 1903, he entered the operating department as assistant to the general superintendent of transportation. From February, 1905, to May, 1912, he served successively as superintendent and general agent of the Philadelphia division at Philadelphia, as assistant to the president and as general superintendent of transportation. He was then promoted to general superintendent of the Baltimore & Ohio Southwestern and the Cincinnati, Hamilton & Dayton (both now parts of the Baltimore & Ohio) at Cincinnati, Ohio, and during federal control served as general superintendent of transportation of the B. & O. and its affiliated lines. On September 1, 1919, Mr. Voorhees was promoted to general manager of the New York Terminal Lines and vice-president and general manager of the Staten Island Rapid Transit; next he was transferred to the western lines of the B. & O. at Cincinnati, with the title of general manager. His election to vice-president at Chicago became effective on June 15.

Executive

Lee H. Landis has been appointed assistant to the president of the Chesapeake Beach Railway, with headquarters at Washington, D. C.

Frank Bailey, chairman of the board of the Prudence Company, has been elected chairman of the board of directors of the St. Louis Southwestern, with headquarters at New York, succeeding **Winslow S. Pierce**. **William M. Greve**, president of The Prudence Com-

pany, has been elected chairman of the executive committee, with headquarters at New York.

Horace E. Newcomet, general manager of the Western Region of the Pennsylvania has been elected vice-president of that region, with headquarters as before at Chicago, succeeding **T. B. Hamilton**, who has been assigned to the direction of matters of general interest and policy in the Chicago district. **W. M. Wardrop**, general superintendent of the Southern division, with headquarters at Wilmington, Del., has been promoted to assistant vice-president and general agent, with headquarters at Detroit,



Horace E. Newcomet

Mich. Mr. Newcomet was born at Philadelphia, Pa., on April 27, 1874, and graduated from the University of Pennsylvania. From 1897 to 1901, he served successively as acting assistant engineer on the Cleveland & Pittsburgh division and assistant engineer maintenance of way on the Cincinnati division. For the following 12 years he was engineer maintenance of way of the Indianapolis & Vincennes division, the Cincinnati division and the Erie & Ashtabula division and division engineer of the Cleveland & Pittsburgh division. He was then promoted to superintendent of the Louisville division in January, 1913, and was transferred to the Logansport division in March, 1918, and to the Cleveland & Pittsburgh division in March 1920. Three years later he was promoted to general superintendent of the Lake Division, with headquarters at Cleveland, Ohio, then being further promoted to general manager of the Western region, with headquarters at Chicago in September, 1926. His election to vice-president of that region became effective on June 12.

Financial, Legal and Accounting

F. V. Slocum has been appointed attorney of the Grand Trunk Western, with Headquarters at Detroit, Mich.

W. T. Lyon, car accountant of the De Queen & Eastern and the Texas,

Oklahoma & Eastern, has been promoted to auditor, with headquarters as before at De Queen, Ark., succeeding **G. C. Leffler**, who has resigned.

C. F. Carlson assistant freight claim agent of the Chicago Great Western, has been promoted to the position of freight claim agent, with headquarters as before, at Chicago, succeeding **G. H. Hunt**, deceased.

The headquarters of **O. E. Moore**, auditor of the Louisiana & Arkansas have been removed from Texarkana, Ark. to Shreveport, La. **J. J. Tippin**, auditor of the Louisiana Railway & Navigation Company, has been appointed assistant auditor of the Louisiana & Arkansas with headquarters as before at Shreveport.

C. B. Neubauer, disbursing accountant on the Southern at Cincinnati, Ohio, has been promoted to auditor with headquarters at the same point, succeeding **K. Kemper**, deceased. **E. Bergelt**, chief clerk to the auditor, has been promoted to assistant auditor, with headquarters at Cincinnati. **F. X. Fleming**, general bookkeeper, has been promoted to auditor of disbursements at Cincinnati.

A. T. Nelson, auditor of the California Western Railroad & Navigation Company, with headquarters at Fort Bragg, Cal., has also been appointed general manager.

George W. McMath, right of way agent of the Oregon-Washington Railroad & Navigation Company, has been promoted to general tax and right of way agent, with headquarters as before at Portland, Ore. **T. B. Collins**, assistant right of way agent at Portland, has been promoted to right of way agent, succeeding Mr. McMath. **L. W. Hobbs** has been promoted to tax agent, with headquarters at Portland.

William E. Eppler, comptroller of the Delaware & Hudson, with headquarters at New York, has retired from the service of that company, effective June 1, to become vice-president of the Phosphorite Coal & Supply Corp. Mr. Eppler was born on August 8, 1888, at Cisco, Tex. He was educated in the high school at Henrietta, Tex., and St. Basil's College, later completing courses at the Alexander Hamilton Institute and the New York University School of Commerce and Accounting. He entered railway service in 1906 with the Atchison, Topeka & Santa Fe at Amarillo, Tex. He served as assistant general bookkeeper, statistician and assistant paymaster of the Louisiana & Arkansas from 1908 to 1910, when he became chief clerk to the auditor of the Missouri & North Arkansas. He then became assistant joint cashier and joint cashier of the Texas & Pacific and the St. Louis Iron Mountain & Southern, (part of Missouri Pacific). For a year he served as chief clerk to the auditor of the Wichita Falls & Northwestern (part of Missouri-Kansas-Texas). Mr. Eppler

entered the service of the Delaware & Hudson in 1912, serving successively as accountant, chief of the bureau of departmental accounts, auditor of expenditures and comptroller of that road and



William E. Eppler

its affiliated companies. Mr. Eppler was recently elected first vice-president of the Railway Accounting Officers Association, having served previously as its second vice-president.

H. D. Chamberlain, who has been appointed comptroller of the Delaware & Hudson, with headquarters at New York, was born on December 26, 1884, at Dunmore, Pa. He was educated in the public schools of that city, and entered railway service as a messenger boy in the office of the president of the Erie & Wyoming Valley (now part of the Erie) in 1898. He served consecutively to February, 1903, as clerk in the purchasing department of the same road, as clerk in the master car builder's office and as bill clerk for the Erie at Dunmore, Pa. From 1903 to 1909, he served in the division superintendent's office of that road as stenographer, assistant timekeeper, maintenance of way clerk and division accountant. He was appointed stenographer in the office of



H. D. Chamberlain

the third vice-president of the Delaware & Hudson at New York, on May 15, 1909, remaining in that position until May, 1910, when he was appointed sta-

tistical clerk in the office of the auditor of disbursements, at Albany, N. Y. He served as chief clerk to the general auditor from October, 1910, to October, 1914, when he became acting freight claim agent. He was appointed freight claim agent in May, 1915. From June, 1918 to March, 1920, Mr. Chamberlain served as auditor for the railroad department of the same road and as auditor of steam railroad, hotel and boat line subsidiaries. On the latter date he was appointed auditor of the D. & H. with jurisdiction over revenue, disbursements and freight claim departments. His appointment as comptroller became effective on June 1.

Operating

George W. Cale, Jr., has been appointed chief surgeon of the St. Louis Southwestern lines, with headquarters at Texarkana, Ark.

F. E. Cheak, trainmaster on the Chicago, Attica & Southern, has been promoted to general superintendent, with headquarters as before at Attica, Ind.

J. E. Byrnes has been appointed superintendent of terminals of the Illinois Terminal System, with headquarters at St. Louis, Mo.

B. C. Byers, superintendent of the Indianapolis Terminal and the Springfield division of the Cleveland, Cincinnati, Chicago & St. Louis, has been appointed terminal manager of the Indianapolis Union, a newly created position, with headquarters as before at Indianapolis, Ind. The position of superintendent of the Indianapolis Union, held by **Pierce J. Landers**, deceased, has been abolished.

Thomas W. Cheatham, superintendent of the Central Kansas and Colorado divisions of the Missouri Pacific, with headquarters at Osawatimie, Kan., has been transferred to the Eastern division, with headquarters at Jefferson City, Mo. Mr. Cheatham succeeds **C. J. Brown**, who has been transferred to the Central Kansas and Colorado divisions to replace Mr. Cheatham.

R. N. Hudson, president and general manager of the Louisville, Henderson & St. Louis, has been appointed staff officer of operation of the Louisville & Nashville, with headquarters as before at Louisville, Ky. **R. C. Parsons** has been appointed assistant superintendent of transportation of the L. & N., with headquarters at Louisville. **A. M. Stevenson** has been appointed assistant superintendent of the Pensacola division of the L. & N. with headquarters at Pensacola, Fla. **J. S. Moorman**, trainmaster on the L., H. & St. L. at Louisville, has been appointed to a similar position on the L. & N.

H. R. McKee, superintendent of the Arkansas River division of the Atchafalaya, Topeka & Santa Fe, with headquarters at La Junta, Colo., has been transferred to the New Mexico division, with head-

quarters at Las Vegas, N. M., succeeding **J. Fred Anton**, deceased. **C. S. Cravens**, assistant superintendent of the Plains division, with headquarters at Amarillo, Tex., has been promoted to superintendent of the Arkansas River division to succeed Mr. McKee.

The Texas & Pacific has consolidated its Denton division with the Fort Worth division, and that part of the Fort Worth division extending from Lancaster Yard, Fort Worth, Tex., to Baird has been made a part of the Rio Grande division. **A. E. Pistole**, superintendent of the abolished Denton division, with headquarters at Fort Worth, has been transferred to the Rio Grande division, with headquarters at Big Springs, Tex., succeeding **C. C. Kilway**, who has been appointed master of transportation of the Rio Grande division with headquarters at the same point. **L. L. Oliver**, senior trainmaster of the Fort Worth division, has been promoted to master of transportation of that division, with headquarters as before at Fort Worth. **O. Marshall**, trainmaster on the Fort Worth division at Fort Worth, has been transferred to the Rio Grande division at Baird. **W. E. Cofer**, trainmaster on the Rio Grande division at Dallas, Tex., has been transferred to Toyah, Tex.

H. L. Reed, general superintendent of the First district of the Chicago, Rock Island & Pacific, with headquarters at Des Moines, Iowa, has been appointed acting general manager of that district with headquarters at the same point, succeeding **Daniel Coughlin**, who has been granted a leave of absence because of illness. **J. J. Breheny**, superintendent of the Oklahoma-Southern division, with headquarters at Fort Worth, Tex., has been appointed acting general superintendent of the First district, replacing Mr. Reed. **F. A. Bogue**, trainmaster at Fairbury, Neb., has been promoted to superintendent of the Nebraska-Colorado division, with headquarters at the same point, succeeding **E. D. Hungerford**, who has been transferred to the Iowa division, with headquarters at Des Moines, to succeed **A. T. Abbott**, deceased. **Kepler Johnson**, trainmaster at Topeka, Kan., has been promoted to superintendent of the Oklahoma-Southern division, to replace Mr. Breheny.

W. C. Higginbottom, general superintendent of the Northwestern division of the Pennsylvania, with headquarters at Chicago, has been promoted to general manager of the Western region, with headquarters at the same point. **Walter S. Franklin**, general agent of the operating department at Detroit, Mich., has been promoted to general superintendent of the Northwestern division, succeeding Mr. Higginbottom. **C. E. Whitlock**, general superintendent of the Southwestern division, with headquarters at Indianapolis, Ind., has been transferred to the Southern division, with headquarters at Wilmington, Del. **O. P. Reese**, general superintendent of motive power of the Central region, with headquarters at Pittsburgh, Pa., has been appointed

general superintendent of the Southwestern division to succeed Mr. Whitlock. **J. A. Appleton**, superintendent of the Pittsburgh division, with headquarters at Pittsburgh, Pa., has been appointed acting general superintendent of the Lake division, with headquarters at Cleveland, Ohio. **F. L. Dobson**, superintendent of the Cleveland division, with headquarters at Cleveland, has been appointed acting superintendent of the Pittsburgh division. **Raymond Swenk**, superintendent of the Erie & Ashtabula division, with headquarters at New Castle, Pa., has been transferred to the Cleveland division, succeeding Mr. Dobson, and **H. T. Frushour**, superintendent of the Monongahela division, with headquarters at Uniontown, Pa., has been transferred to the Erie & Ashtabula division to replace Mr. Swenk. **J. C. Poffenberger**, division engineer of the Middle division, with headquarters at Altoona, Pa., has been promoted to superintendent of the Monongahela division, succeeding Mr. Frushour.

Richard E. Kemper, who has been promoted to superintendent of the Henderson and St. Louis divisions of the Louisville & Nashville, with headquarters at Evansville, Ind., has been in the service of that railroad for 43 years. He was born in Laurel county, Ky., on May 17, 1872, and entered railway service on



Richard E. Kemper

May 1, 1886, on the Louisville & Nashville. Four years later he was promoted to dispatcher at Evansville, then being further promoted at Evansville to chief dispatcher in 1894, to master of trains in 1903 and to assistant superintendent in 1920. Mr. Kemper served as assistant superintendent of the Henderson and St. Louis divisions until his recent advancement to superintendent.

C. W. Van Horn, who has been promoted to general manager of the Western Lines of the Baltimore & Ohio, with headquarters at Cincinnati, Ohio, has been connected with the operating department of that railroad for 28 years. He was born at Clarksburg, W. Va., on January 17, 1879, and attended Salem College, entering railway service as a clerk on the B. & O. at Fairmont, W.

Va., in June, 1901. Later Mr. Van Horn served successively as agent at Byron, W. Va., Flemington and Clarksburg and as general yardmaster at the latter point. In April, 1911, he was appointed chief clerk to the general superintendent of transportation at Baltimore, Md. In the same year he was promoted to trainmaster of the Monongah division at Grafton, W. Va., then being transferred to Chicago and to Willard, Ohio. From April, 1916, to June, 1923, he served as assistant superintendent of the Pittsburgh division and as superintendent at New Castle Junction, Pa., at Grafton and at Cumberland, W. Va. He was then



C. W. Van Horn

promoted to general superintendent of the Maryland district at Baltimore and in January, 1926, he was again promoted to general superintendent of transportation, with headquarters at the same point. Mr. Van Horn's promotion to general manager of the Western lines became effective on June 15.

W. C. Higginbottom, who has been promoted to general manager of the Western region of the Pennsylvania, with headquarters at Chicago, has spent



W. C. Higginbottom

his entire railway service of 34 years in the operating department of that company. He was born in Stark county, Ohio, on May 14, 1880, and began his railway career as a telegraph operator

on the Eastern division of the Pennsylvania at the age of 15 years. In August, 1907, he was advanced to chief dispatcher's clerk, then being further advanced to dispatcher and to assistant trainmaster. From October, 1918, to 1921, Mr. Higginbottom served successively as trainmaster on the Eastern division, freight trainmaster on the Pittsburgh terminal and assistant superintendent of the Pittsburgh division. He was promoted to superintendent of the Peoria division on November 16 of the latter year, being later transferred to Richmond, to the Panhandle and to the Philadelphia divisions. On June 16, 1927, he was promoted to general superintendent of transportation of the Western region, with headquarters at Chicago, and in May, 1928, he was again promoted to general superintendent of the Northwestern division, with headquarters at the same point. Mr. Higginbottom's promotion to general manager of the Western region became effective on June 15.

Donald F. Stevens, who has been promoted to general superintendent of transportation of the Baltimore & Ohio, with headquarters at Baltimore, Md., has been in railway service for 30 years. He was born at Minneapolis, Minn., on November 4, 1882, and received his academic education at Shattuck Military Academy, Fairbault, Minn., Cascadilla



Donald F. Stevens

School, Ithaca, N. Y., and Cornell University. At the age of 16 years he entered the service of the Great Northern as a clerk. With that road he also served as an axman, and from June, 1902, to May, 1914, he was engaged successively as a timekeeper on the Canadian Pacific, a rodman on the Great Northern, a clerk and gang foreman on the Chicago, Rock Island, & Pacific, a roadmaster on the Great Northern, an extra-gang foreman on the Rock Island, and as a yardmaster, trainmaster and terminal trainmaster on the New York, New Haven & Hartford. Mr. Stevens was then appointed assistant supervisor of fuel consumption on the B. & O., being advanced to trainmaster in November, 1914, to assistant superintendent in May, 1915, and to superintendent of the Newark division in January, 1916.

Two years later he was transferred to the New Castle division at New Castle Junction, Pa., and in April, 1922, to the Akron division at Akron, Ohio. In April, 1923, he was promoted to general superintendent of the Northwest district, with headquarters at Cleveland, Ohio, his further promotion to general superintendent of transportation becoming effective on June 15.

R. B. Mann, who has been promoted to general superintendent of the Southwest district of the Baltimore & Ohio, with headquarters at Cincinnati, Ohio, is a native of Cottonwood Falls, Kan. He first entered the service of the Baltimore & Ohio in 1910 as chief clerk to the superintendent of the Toledo division, which was then a part of the Cincinnati, Hamilton & Dayton. In 1912 he was advanced to assistant trainmaster then successively occupying the positions of inspector of transportation, general agent and assistant superintendent. Mr. Mann was promoted to superinten-



R. B. Mann

dent of the Delphos division in 1916 where he remained until May, 1917, when he was transferred to what was formerly the Illinois division. The same year he was transferred to the old Indiana division, later being transferred to the Toledo division and to the Akron division. On August 1, 1924, he was promoted to superintendent of transportation of the Western Lines, with headquarters at Cincinnati. Mr. Mann's further promotion to general superintendent of the Southwest district became effective on June 15.

Traffic

T. Y. Newman has been appointed general agent of the New York Central, with headquarters at Rochester, N. Y.

William R. Short has been appointed general agent of the Fort Smith & Western at Detroit, Mich.

W. E. Karcher, Jr., has been appointed assistant general freight agent of the Alabama, Tennessee & Northern, with headquarters at Mobile, Ala.

C. E. Flowers has been appointed assistant general freight agent of the

Southern, with headquarters at Cincinnati, Ohio.

George Fuqua and **John P. Faurot** have been appointed general agents of the Chicago, Attica & Southern at Dallas, Tex., and Detroit, Mich., respectively.

T. C. Whitmarsh has been appointed assistant traffic manager of the Chicago, Springfield & St. Louis and the Jacksonville & Havana, with headquarters at St. Louis, Mo.

E. F. Kessler and **A. M. McCallum** have been appointed assistant foreign freight agents of the Chesapeake & Ohio with headquarters at Cincinnati, Ohio, and Detroit, Mich., respectively.

Frank R. Forbes, district freight and passenger agent for the Spokane, Portland & Seattle at San Francisco, Cal., has been promoted to general agent at Spokane, Wash.

W. E. Duffey, supervisor of fast freight operation of the Baltimore & Ohio, with headquarters at Baltimore, Md., has been appointed transportation assistant at Detroit, Mich., a newly created position.

Forrest A. Brown, assistant general passenger agent of the Chicago, St. Paul, Minneapolis & Omaha, has been promoted to general passenger agent, with headquarters as before at Minneapolis, Minn.

E. E. Pierce has been appointed assistant general passenger agent of the Boston & Albany with headquarters at Boston, Mass. **W. J. Graham** has been appointed general agent of that road, with headquarters at Boston.

E. M. Womack, general passenger agent of the Louisville, Henderson & St. Louis, has been appointed assistant to the general passenger agent of the Louisville & Nashville, with headquarters as before at Louisville, Ky.

E. D. Mays, commercial agent of the Seaboard Air Line, with headquarters at Winter Garden, Fla., has been appointed district freight agent, with headquarters at Orlando, Fla. **E. H. Browne** will succeed Mr. Mays as commercial agent at Winter Garden, Fla.

W. M. Andrews, assistant to the general freight agent of the Seaboard Air Line, with headquarters at Norfolk, Va., has been appointed assistant to the freight traffic manager, with the same headquarters. The position formerly held by Mr. Andrews has been abolished.

J. D. Jones, soliciting agent for the Missouri Pacific at Tyler, Tex., has been promoted to general agent of the freight department at that point, succeeding **C. E. Wood**, who retired from active duty on June 1 after 46 years of service with the Missouri Pacific.

A. Blauel, chief of the tariff bureau of the Erie at Chicago, has been promoted to assistant general freight agent, with

headquarters at the same point. **E. C. Hallberg** has been appointed chief of the tariff bureau at Chicago, succeeding Mr. Blauel.

D. W. Quick, general agent for the Chicago Great Western at Philadelphia, Pa., has been promoted to assistant general freight agent, with headquarters at Omaha, Neb., succeeding **W. F. Stewart**, who resigned on June 15. **George L. Springer**, traffic agent at Philadelphia, has been promoted to general agent at that point, succeeding Mr. Quick.

R. H. Eberly, senior assistant general freight agent of the Seaboard Air Line, with headquarters at Norfolk, Va., has been appointed general freight agent with the same headquarters, succeeding **J. H. Toomer**, deceased. **W. A. Marshall**, assistant general freight agent, with headquarters at Norfolk, will succeed Mr. Eberly as senior assistant general freight agent at that point, and he will in turn be succeeded by **H. N. Morris**.

Harvey M. Johnson, foreign freight agent of the Missouri Pacific, with headquarters at St. Louis, Mo., has been promoted to general freight agent, with headquarters at Kansas City, Mo. **J. B. Potter** has been appointed general agent of the freight and passenger departments at Boston, Mass. **J. D. Yates**, commercial agent at Oakland, Cal., has been promoted to general agent of the freight department at Los Angeles, Cal., succeeding **D. C. Dibble**, who retired from active service at his own request on May 1.

Harry A. Mintz, who has been promoted to general freight agent of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul, Minn., was born in that city in 1889. He entered railway service on October 1, 1908, as a clerk in the tariff bureau of



Harry A. Mintz

the Omaha, subsequently occupying various positions in the traffic department, including that of chief of the tariff bureau. In June, 1922, Mr. Mintz was promoted to assistant general freight agent, with headquarters at St. Paul, Minn., a position he held until his further promotion to general freight agent on June 1.

J. N. Campbell, traffic manager of the Louisiana Railway & Navigation Company, has been appointed assistant general freight agent of the Louisiana & Arkansas, with headquarters as before at Shreveport, La. **W. R. Henry** and **J. A. Williamson** have been appointed assistant general freight agents, with headquarters at Shreveport. **S. S. Senne**, assistant general freight agent for the L. R. & N. at St. Louis, Mo., has been appointed to a similar position with the Louisiana & Arkansas. **A. P. Maguire** and **H. H. Jordan**, commercial agents for the L. R. & N. at Baton Rouge, La., and Chicago, have been appointed general agents of the L. & A. at those respective points. **Roy M. Dunlap**, commercial agent for the L. & A. at Fort Worth, Tex., has been promoted to general agent at Detroit, Mich.

Edward A. Donnelly, who has been promoted to freight traffic manager of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at Minneapolis, Minn., has been connected with that railroad for more than 40 years. He entered railway service at an early



Edward A. Donnelly

age in the local offices of the Omaha at St. Paul, Minn., and advanced through various positions in the traffic department, including those of traveling freight and passenger agent, commercial agent at Minneapolis and general agent at the same point. In 1921, Mr. Donnelly was promoted to assistant general freight agent at Minneapolis, his further promotion to freight traffic manager becoming effective on June 1.

Mechanical

F. S. Kelly, master mechanic on the Texas & Pacific at Texarkana, Tex., has been appointed assistant master mechanic of the Fort Worth division at the same point.

Frank C. Ferry, master mechanic of the Louisville, Henderson & St. Louis, with headquarters at Cloverport, Ky., has resigned following the taking over

of this railroad by the Louisville & Nashville.

R. H. Flinn, superintendent of motive power of the Western Pennsylvania division of the Pennsylvania, with headquarters at Pittsburgh, Pa., has been promoted to general superintendent of motive power of the Central region, with headquarters at the same point, succeeding **O. P. Reese**, who has been appointed general superintendent of the Southwestern division. **H. W. Jones**, master mechanic at the Juniata shops at Altoona, Pa., has been promoted to superintendent of motive power of the Western Pennsylvania division to replace Mr. Flinn.

Obituary

G. H. Hunt, freight claim agent of the Chicago Great Western, with headquarters at Chicago, died of pneumonia at the Columbus Memorial Hospital in that city on June 13.

George B. Reeves, auditor of disbursements of the Louisville & Nashville, with headquarters at Louisville, Ky., died at St. Anthony's Hospital in that city on June 11 following an operation and an illness of a year. Mr. Reeves was 62 years old and had been in the service of the Louisville & Nashville for 42 years.

John M. Ball, assistant freight traffic manager of the Gulf Coast Lines and the International-Great Northern, with headquarters at Houston, Tex., died at his home in that city on June 10, at the age of 55 years. He had been in railway service for 36 years, 27 of which were with the traffic department of the International-Great Northern. A complete sketch of Mr. Ball's railway career and a reproduction of his photograph appeared in the *Railway Age* of May 5, 1928, page 1076.

Hugh Spencer, who died recently at Long Beach, Cal., at the age of 83 years, had been in railway service for nearly 54 years. For several years prior to 1900 he was superintendent on the Chicago, St. Paul, Minneapolis & Omaha, at St. Paul, Minn., and at Sioux City, Ia., and from 1901 until his retirement in 1917 he was successively general superintendent of the Butte, Anaconda & Pacific and as superintendent of two roads now part of the Chicago, Milwaukee, St. Paul & Pacific, the Chicago, Milwaukee & Puget Sound and the Montana.

James Fred Anton, superintendent of the New Mexico division of the Atchison, Topeka & Santa Fe, with headquarters at Las Vegas, N. M., died at Clovis, N. M., on June 10 from a fractured skull and broken back received in an automobile accident near Santa Fe, N. M., on June 4. Mr. Anton had been in railroad service for nearly 30 years, 23 of which were with the Santa Fe. He was born on May 23, 1885, at Hague,

Va., and entered railway service in September, 1899, as a clerk on the Baltimore & Ohio. Six years later he was advanced to yardmaster and then for nearly a year he served as a yardmaster on the Missouri Pacific. Mr. Anton started with Santa Fe as a switchman at Pueblo, Colo., in June, 1906. For the following 12 years he advanced successively through the positions of engine foreman at La Junta, Colo., night yardmaster at Las Vegas, general yardmaster at the same point and assistant trainmaster on the Rio Grande division. From June, 1918, to August, 1919, he was a first lieutenant of engineers, serving overseas as battalion adjutant of the Sixty-Ninth Engineers and as terminal trainmaster at St. Sulpice, France. He returned to the Santa Fe as trainmaster on the Rio Grande division and after being transferred to the Plains division at Amarillo, Tex., in February, 1920, he was promoted to superintendent of the Slaton division of the Panhandle & Santa Fe, with headquarters at Slaton, Tex., in August of that year. Mr. Anton had been superintendent of the New Mexico division of the Santa Fe since 1927.

Thomas A. Lawes, former superintendent of motive power of the Chicago & Eastern Illinois and mechanical engineer of the Cleveland, Cincinnati, Chicago & St. Louis and the New York, Chicago & St. Louis, died at Cleveland, Ohio, on June 4 following an operation. Mr. Lawes had been in railway service for 53 years. He was born at Franklin, La., on September 1, 1852, and began his railway career as an apprentice machinist on the Terre Haute & Indianapolis (now part of the Pennsylvania) in 1866. Later he was advanced on this road through the positions of machinist, draftsman, gang foreman and general foreman. From 1882 to 1891 Mr. Lawes served on the Cleveland, Columbus, Cincinnati & Indianapolis (now part of the Big Four) as draftsman, chief draftsman, general foreman in the locomotive department and master mechanic. He was then appointed engineer of tests of the Erie and also acted as assistant master mechanic and master mechanic. During 1892 and 1893 he was mechanical engineer of the Fisher Electric Company at Detroit, Mich., then returning to railway service as mechanical engineer of the Big Four at Indianapolis, Ind., where he remained until 1896 when he was appointed superintendent of motive power and machinery of the Chicago & Eastern Illinois, with headquarters at Danville, Ill. From December, 1904, until his retirement on October 1, 1922, Mr. Lawes had served as mechanical engineer of the Nickel Plate, with headquarters at Cleveland, except for a short period in 1909, 1910 and 1911, when he was master mechanic of the Chicago, Terre Haute & Southeastern (now part of the Chicago, Milwaukee, St. Paul & Pacific). Since his retirement he had spent a large amount of his time in Florida.

Railway Age

Motor Transport Section

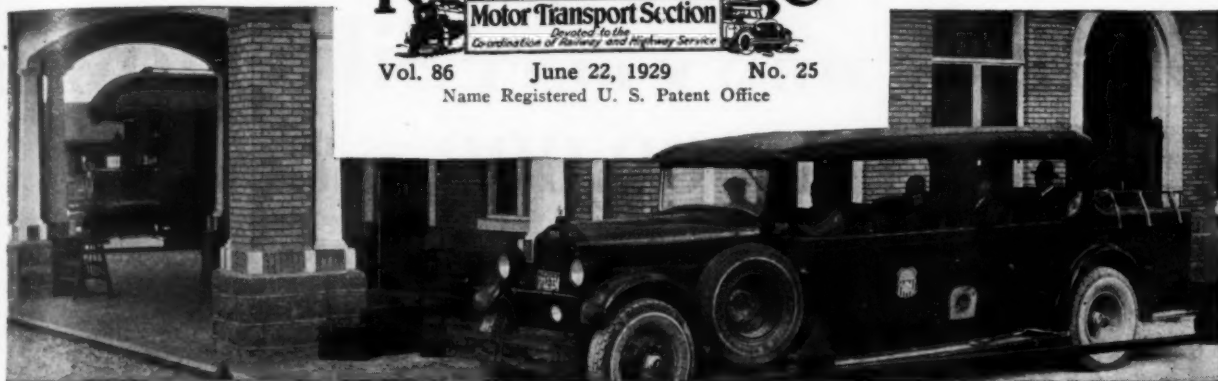
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A Larger Motor Transport Section

THERE are twice as many editorial pages in this issue of the *Motor Transport Section* as have been published customarily in issues in the past. This is not in response to some special event; on the contrary, the larger size of this issue, and the broadened scope of its editorial contents, will be the standard for succeeding issues. In other words, from now on, the size editorially of the *Motor Transport Section* will be approximately the same as that of other transportation papers.

Changing conditions in the transportation field, of which the transportation papers are but a reflection, have rendered necessary this increase in the size and scope of the *Motor Transport Section*, in order that our readers may be served adequately. These changing conditions have been felt strongly by the railways themselves. Equipment once adequate is now inadequate; methods once satisfactory are now unsatisfactory; railway officers, by force of circumstances, are studying and learning new and better ways of carrying on their business of supplying good transportation service.

Not long ago, motor transport had a very minor place in the railway picture. On a few roads it had been taken up in a rather gingerly fashion, as one picks up a strange object the strength of which has not been demonstrated. The story of the spread of the idea of co-ordinated rail and highway transportation has been told and retold. It needs no further repetition here; everyone, surely is familiar with it. Suffice it to say that motor coaches and motor trucks, tractors and trailers have come to be considered an essential part of the equipment of the railway which is operated efficiently, in the modern manner, and with the changing needs of its patrons definitely in mind.

The *Motor Transport Section* of the *Railway Age* was established a little more than three years ago. By its original small size—ten pages in the main body of the *Railway Age*—the *Motor Transport Section* reflected the small place which motor transport had then won for itself in the railway business. This place grew rapidly, however, and in response to this growth the *Motor Transport Section* soon began to appear as a separately-bound part of its parent publication, with enlarged editorial contents—a minimum of 24 editorial pages in each

issue. Now, so well-defined has motor transport become in the railway scheme of things that the present doubling in size has been effected, the *Motor Transport Section*, by its similarity in size to other transportation papers devoted to individual departments of railroading, reflecting the new importance of the motor transport departments of the railways.

With respect to the nature of its editorial contents, the new, larger *Motor Transport Section* will be somewhat different from its predecessor. In view of conditions prevailing in the past, it has been felt up to this time that the readers of the *Motor Transport Section* were more vitally concerned with questions of how and where they could use motor vehicles than with questions of practical motor coach and truck operation and maintenance methods. Consequently, the former subject received more editorial attention than the latter. Now, however, while the former subject is still distinctly with us, the status of railway motor vehicle operation has become such that a substantial number of our readers are as much or more concerned with the actual operation and maintenance of motor vehicles as they are with the broader subjects.

More than half of the enlarged *Motor Transport Section*, therefore, will be devoted to the discussion of the problems of operating and maintaining motor vehicles. However, there will be no slighting of the broader questions of railway train and highway vehicle co-ordination. An effort will be made to provide railway officers with information of which they can make good use, whether it be relative to the basic or the narrower questions of railway motor transport. There will continue to be articles about the results that the railways are securing from the operation of motor coaches and trucks, just as many of them as in the past and perhaps even more. There will be articles about successful methods of motor coach and truck operation and maintenance, many more of them than we have previously published. There will continue to appear discussions of regulation and taxation matters, and it is anticipated that this will be an important feature of the paper since regulation and taxation are certain to move closer and closer to the front of the minds of officers in charge of motor transport services.

Several new departments will be added. One such department makes its appearance in this issue under the temporary title, "Questions and Answers." Particular attention to it is invited, for, more than any other feature of the paper, it will be written by and for our readers. The news department has likewise been expanded and it will become even larger as time goes on, for the amount of news about railway motor transport developments is increasing steadily and rapidly. One other new department will be established in an early issue, this department devoted to "Short Cuts" in the operation and maintenance of motor coaches and trucks, describing new and better ways of doing specific jobs, which the original minds in the motor transport field have devised.

In this issue there is a larger number of contributed articles than ever before. It is hoped that future issues will be similarly favored with articles by such authorities on the various questions with which our readers are concerned. An earnest effort will be made to secure as regular contributors those men in the industry best qualified to discuss the subjects of great present interest.

The *Motor Transport Section* is intended to be of service to its readers, men now or soon to be in charge of different phases of railway motor transport operations. We have been gratified by the many assurances which have been given us that it has been of such service. We hope that its new larger size and its expanded editorial scope will meet with general approval and that the *Motor Transport Section* will be found of proportionately greater value to its readers.

Suggestions of means of improving the *Motor Transport Section* are always welcome, and particularly so at this time.

Meeting Modern Conditions with Better Freight Service

CHANGES in the methods under which business activities are carried on naturally require changes in the way in which that essential part of trade activity, transportation, is carried on. Ordinary freight car service was quite adequate and satisfactory to shippers under conditions of business as they existed some years ago. But present business methods are such as to require the transportation of shipments in smaller quantities and with greater speed, so that the freight car is no longer the universally satisfactory carrier that it once was. Still useful in many ways and still capable of handling well the great bulk of the nation's traffic, the freight car is nevertheless handicapped in providing the form of fast transportation now demanded for light shipments moving relatively short distances. These changes in the transportation situation which have been brought about by changing business methods are discussed in this issue of the *Motor Transport Section* by L. B. Young, manager of the Pacific Electric Motor Transport Company, which is providing store-door collection and delivery service at nearly fifty points in Southern California served by the Pacific Electric. Mr. Young is particularly well-fitted to write upon this subject for he is located in a region where conditions are such as to present an excellent opportunity for the development of short haul, l.c.l. freight business. In charge of the Pacific Electric's motor vehicle freight service, he has seen an enthusiastic reception accorded by shippers to his company's new freight-handling system, a complete, fast, door-to-door service which gives full consideration to modern business methods. Mr.

Young's article is a sound, constructive discussion of a subject which is or should be uppermost in the mind of every railway officer.

Further Instances of Savings from Highway Operations

THE April issue of the *Motor Transport Section* called attention to savings of \$28,000 a year which have been realized by the Jersey Central through the operation of one motor truck in l.c.l. freight service. It was suggested in editorial comment on this operation that no doubt there are many similar situations on other railroads where unprofitable trains might be replaced by motor vehicles with substantial net economies resulting. An article in the May issue set forth how the Richmond, Fredericksburg & Potomac, in addition to its early success on its Richmond-Washington motor coach route, is realizing a net economy of \$12,000 a year through the substitution of motor coach service for an unprofitable Richmond suburban train. Now the Central of Georgia, as pointed out elsewhere in this issue, anticipates annual savings amounting to \$50,000 from recent replacements of unprofitable trains by three motor coaches and three trucks. These cases are less spectacular than that of the Jersey Central, since the nature and special characteristics of the individual operation will, of course, modify possible savings through substitution. The savings are nevertheless considerable and thus further emphasize the desirability for railroads to study the possibilities of increasing their net revenue by an economically sound co-ordination of rail and highway service.

The Railways and the Independents Get Together

IT has been felt for some time that sooner or later the railways would control or have a substantial interest in most if not all of the intercity motor coach lines. Such a development appeared logical, and promised benefits not only to the railways and the motor coach lines but also to the general traveling public. Confirmation of this expectation has been given by two recent announcements. One was that the Southern Pacific has joined with virtually all of the independent motor coach lines in the territory served by its Pacific System in the organization of a holding company to operate all these lines and also the Southern Pacific's motor coach operating subsidiary, the Southern Pacific Motor Transport Company. The other was that the Pennsylvania has acquired an interest in the Greyhound Lines, operating very extensive motor coach lines in the region east of the Mississippi to the Atlantic seaboard. Co-ordinated service will be offered by the Pennsylvania's trains and the Greyhound Lines' motor coaches. This news anticipated for some time, is very significant. It means that two leading railways, one in the East and one in the West, are now allied with and have made a part of their transportation systems, the largest and most successful of the independent motor coach operating lines. There is now better reason than ever to believe that nearly if not quite all intercity motor coach service will ultimately have steam railway sponsorship. It would not be surprising if this occurred soon.

New England Has

Efficient Stores System

*By E. S. Montgomery,
special assistant to vice-
president, N. Y., N. H., & H.
and E. W. Sadler, storekeeper,
New England Transporta-
tion Company*

THE efficient functioning of the stores system which has been installed by the New England Transportation Company has contributed much toward securing a rapid turnover of material stocks, the elimination of obsolete items without loss and the operation of the department with a minimum of personnel. The system is patterned on that of the New York, New Haven & Hartford Railroad, parent corporation of the New England, with such minor changes as were necessary to adapt the plan to the special requirements of the highway subsidiary. It was adopted after experience with two other systems which were found inadequate to cope with the rapid extension of the company's motor coach operations.

The vice-president of the New Haven in charge of purchases and stores has similar jurisdiction in the New England Transportation Company. The purchasing organization of the parent company, at New Haven, Conn., functions for the highway subsidiary with the New England Transportation Company storekeeper and force, located at Providence, R. I., having charge of all materials and supplies for Lines East, whereas with reference to Lines West the situation is handled by the Connecticut Company, street railway subsidiary of the New Haven, working in conjunction with the vice-president of the railroad at New Haven.

As was stated at the outset the organization and personnel of the New Haven purchasing department have been applied to the requirements of the highway company. Immediately subsequent to the organization of the latter, iden-

tical methods, forms and practices in effect on the parent railroad company were used. This has been to the material advantage of the subsidiary because of the railroad's greater purchasing power and economies which have been possible. As a result of experience administrative details have been worked out to the best mutual

advantage of the parent and the subsidiary.

During March, 1926, the New England Transportation Company stores department proper was organized at Providence. Prior to that date the requisitioning of material, etc., had been handled through the superintendent's office. Material on hand was listed, a temporary, somewhat complicated system of stock records was established, shelving was erected and the material stored at a leased garage on Eddy street, Providence.

Stocks expanded rapidly co-incidental with the growing requirements of the mechanical and operating departments and in addition sub-stocks were established wherever mechanical forces were maintained for the protection of equipment. It is impractical to maintain stores department employees at outlying points as the results obtained do not warrant the expense. Under these circumstances, therefore, the co-operation of the operating and mechanical department was solicited and their employees act as representatives of the purchasing

and stores department in the handling of these minor stocks. Materials and supplies, however, whether located in the general store at Providence or at the sub-stock stores, are under the jurisdiction of the purchasing and stores department until actually charged



Shelving for Storing Miscellaneous Materials on Balcony Overlooking Main Store Room

[illegible][illegible]

FORM 100

8

UNITED STATES FIRE COMPANY
TIRE CHANGE TAG

Date of Tire Change 4/16/57
Coach No. 407
Tire Removed No. 22666
Cause of Removal Blown out
Tire Applied No. 22666
Odometer Reading Sullivan
Tire Changed BY POSITION APPLIED TO
COACH (ONE)

LV RE LK LK RNT RNT WARE

FOR UNITED STATES FIRE REPRESENTATIVE'S
USE ONLY
(CHECK ONE)

CASEING IMP WFL I L TUBE IMP WFL I L

Inspected by: DETACHEE AND TRANSPORTATION CO.
AUDITOR OF FORMS 1-10
WITH 1-10

Date 4/16/57 Coach No. 407
Station 3626 Odometer Reading 24652
Tire Removed No. 22666
Cause of Removal Blown out
Tire Applied No. 22666
Tire Changed BY POSITION APPLIED TO
COACH (ONE)

LV RE LK LK RNT RNT WARE

TO
HON. CO.
No. 407
234692
and
war
TO
RKO SPARE

AUTHORITY FOR EXPENDITURE		OPERATING							
Charge	Month	Amount	Year	Amount	Gasoline	Lube	Class	Other	Total
0	9	1							
3	4	12							
1	2	6							
1	2	4							
0	1	2							

DESCRIPTION				WRITE NOTHING IN THESE COLUMNS		
Quantity	Price	Amount				
1st w/pw	Gasolene	Cement				
Roller	Toilet	Paper				
Folbath	Blades					
Folbath	Arms					
Folbath	Cleaners					

PUMP READING		GALLONS	
Starting	Ending	Used	Balance
74298	74318		

NEW ENGLAND TRANSPORTATION CO.									
Record of Gasoline and Oil Disbursements									
DATE	PUMP READING		GALLONS GASOLINE	OIL QUANTS			CAR NO.	SIGNATURE	
	Starting	Ending		L	qt	oz			
5/6	74298	74307	9				607	Smith Johnson Becker	
5/6	74307	74317	10				508		
	74321	74326	9				507		

Form 23-6 (Rev. 1-60)

DUPLICATE

NEW ENGLAND TRANSPORTATION CO.

(12)

Storekeeper: Pro Date: 1962

PLEASE DELIVER TO BEARER

QUANTITY	ARTICLE	WRITE NOTHING IN THESE COLUMNS		
		PIECE NO.	PRICE	AMOUNT
6	7/8 Spark Plug			
	Sample Copy			
To be used for: _____		TOTAL _____		
Charge and copy to: <u>axd</u> <u>30c.</u> _____		Check: <u>602</u> _____		
Foreman: _____				

- 6 and 7. Tire Records
8. Tire Change Tag
9. Service Part Removal Tag

10. Requisition for Sub-Stocks
11. Gasoline Disbursement Record
12. Stock Disbursement Record

out. While the institution and maintenance of stock rooms at these sub-stock points is a prerogative of the purchasing and stores department it is nevertheless, according to circumstances, handled as a joint facility with the mechanical or operating department personnel.

When the modern garage facilities of the New England on Knisley avenue, Providence, were opened in January, 1927, accommodations were provided for the stores department and as of January, 1928, the stock record system then in use was supplanted by a simplified and more practical system similar to the methods and practices followed by the stores department of the New Haven.

The stores department of the N. E. T. originates all purchase requisitions for all classes of material, supplies and equipment, except stationery, for all departments, and handles all invoices for material. The stock room has been sectionized, material classified and otherwise systematized so that all items may be handled with a minimum of delay and confusion.

Because of the varied equipment, it is necessary to carry in stock parts for Mack, White, Yellow, Pierce Arrow, Fageol, A. C. F. and Versare motor coaches; also a complete electrical stock, paints and painters supplies, glass, etc. In view of the proximity of the service stations of some chassis manufacturers from which deliveries may be secured in from 24 to 48 hours, it is practical to minimize the stock of specific parts, but other parts and material must be carried on the basis of 30 days' supply on hand, 30 days' supply due when ordering 30 days' requirements. All junk or obsolete material is handled by the purchasing and stores department, as also is all material and parts to be returned as defective or for any other reason.

Purchases for the calendar year, 1928, (exclusive of Connecticut Company territory) amounted to \$348,979.26; issues, \$342,351.43; balance, December 31, 1928, \$66,302.50; per cent issued of total available, 8.37; payroll \$9,509.71. The foregoing reflect conditions in the Lines East territory, covering the main store at Providence and thirteen sub-stock points. All disbursement requisitions at Providence and sub-stock points are handled through the stores account daily and duplicates forwarded to the auditor for his daily coach distribution unit accounting, which is of material assistance in the preparation of the budget.

Stock Book Is Basic Record

The basic record of the present stores system is the stock book in which all stock items are listed. In order to facilitate the handling and to enable the storekeeper to watch balances and turnover on different types of material intelligently, the stock is divided into 21 classes. These classifications are listed in an accompanying tabulation. Entries in the stock book are made numerically or alphabetically according to these classifications and

with further subdivision according to the makes of coaches. Columns are provided for recording the average monthly consumption of each item, amounts on hand each month, amounts requisitioned, requisition numbers, amounts delivered on requisitions and balances due, if any. A typical page from this stock book, as well as reproductions of all other forms to be discussed appear in the accompanying illustrations.

When the material is received it is placed on shelves in the same relative manner as it appears in the stock book and, when possible, is unit piled. A monthly physical inventory of all items is taken and this is entered in the stock book and is in lieu of a perpetual inventory maintained by subtracting each disbursement on cards or books. Thus with actual physical "stock on hand" figures showing each month the storekeeper is able to order material intelligently on a basis of average monthly consumption with no possibility of clerical errors distorting the stock balance figures. The time consumed in securing this monthly physical inventory is more than offset by the time saved in not attempting a perpetual book inventory.

After the monthly inventory is compiled by stockmen, the storekeeper personally examines each item. From this examination he determines the amount of each item to be ordered and enters such amounts in the "Ordered column of the stock book. He secures this figure by noting the consumption over a number of months and on this basis requisitions for sufficient material to cover requirements for whatever length of time it has been deemed necessary on the article involved. If, on the other hand, items which are no longer being used are encountered, a note is made of them and, if any investigation shows that the particular items need no longer be carried in stock, steps

are immediately taken to dispose of their balance on hand in the most advantageous manner.

Purchases Made Through Railroad

When the storekeeper has thus examined all items and entered quantities to be ordered, the stock book goes to a stenographer who prepares requisitions (Form 5-1-NET) accordingly. This form shows the amount on hand, amount on order, average monthly consumption and quantity required. When compiled and signed by the storekeeper, the original copies of the requisitions are mailed to the office of the New Haven vice-president in charge of purchases and stores who acts in a similar capacity for the New England. Here purchase orders are prepared and placed. The second copy of each requisition goes to the stockman in charge of the class of material on order in order that he may be familiar with what material deliveries are expected and also that he may check the copy against the stock book. The third copy (the one reproduced in the illustration) has several columns which appear neither on the original

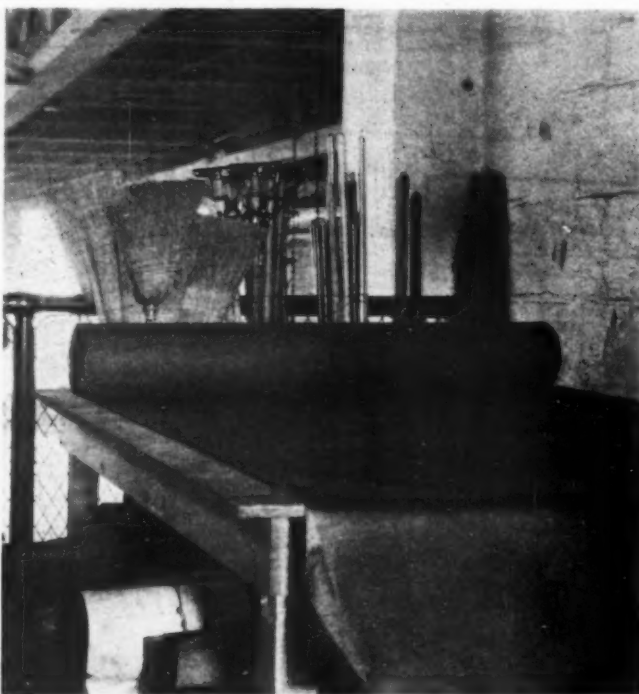


Table on Which Fabrics Are Cut to Size

which goes to the vice-president nor the duplicate which goes to the stockman. These triplicates are bound and retained in the general stores office. The additional columns are for recording the receipt of material, invoices and other delivery data.

Upon receiving a consignment of material the receiving clerk prepares a tally sheet showing the shipper's

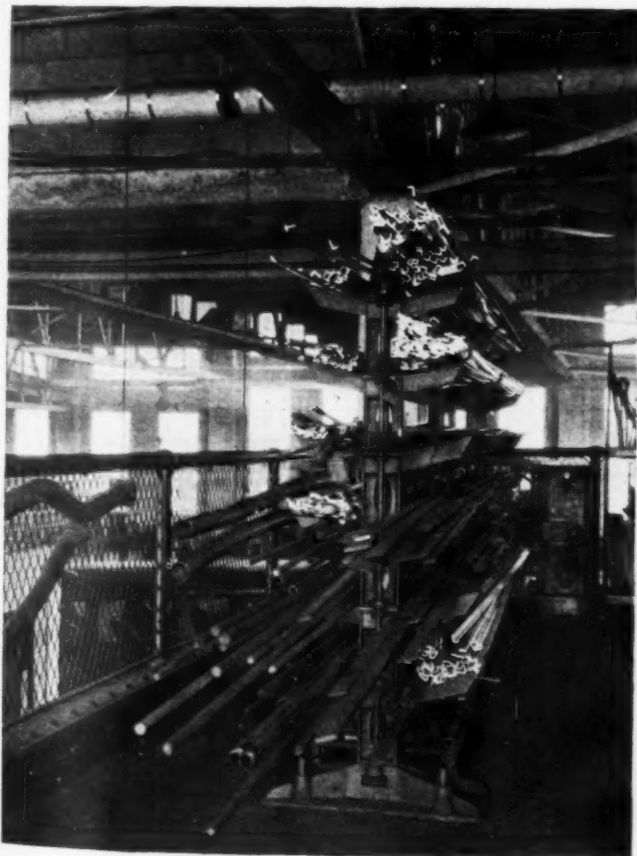
Classification of Material Stocks

- 1—Engine, Transmission, clutch and radiator parts.
- 2—Front and rear axles, chassis parts, steering gear.
- 3—Brake parts, air spring material.
- 4—Bearings, Miscellaneous shelf hardware.
- 5—Bolts, Nuts, Cotter, Lock washers, wood screws etc.
- 6—Packing, Tinware etc.
- 7—Pipe and fittings, plumbing supplies.
- 8—Paints, brushes, drugs, rags, soap, etc.
- 9—Body hardware, upholstery materials etc.
- 10—Iron, steel, aluminum, chains etc.
- 11—Electrical material of all kinds.
- 12—Shop tools, files, drills, knives etc.
- 13—Lumber.
- 14—Ice.
- 15—Material in process of manufacture.
- 16—Gasoline.
- 17—Oil.
- 18—Tires.
- 19—Stationery.
- 20—Cash boxes, fare registers etc.
- 21—Sub Stocks.

name, how shipped, date received and order number. He then records this receipt of the material in the stock book by symbol against the quantity ordered and delivers his tally sheet to the office for a transfer of its data to the third copy of the requisition. When the invoice is received it is likewise recorded on this requisition triplicate, completing that record. Amounts are then taken into the stock account and classified before the invoice is forwarded to the order.

Disbursement of Material

Material is disbursed by stockmen upon receipt of a disbursement slip, (Form 22-2 NET) signed by a fore-



Special Racks on Balcony for Storing Long Metal Strips and Bars



Shelving Used to Store Gaskets in an Orderly Fashion

man. As was stated in the foregoing, disbursement slips go to the stores department office at the end of each day. There are priced, classified, taken into the accounting records and the originals are forwarded to the auditor. Gasoline is disbursed on a special form (Form 57 NET) showing pump readings. This record, however, is handled in the same manner as is Form 22-2 NET, just described.

A cash value balance is maintained from month to month for each class, all material received being added and all disbursements deducted. Likewise a monthly report is prepared showing receipts and disbursements and balance for each class of material. From this latter the storekeeper can tell at a glance whether or not the balances are increasing and turnover is satisfactory and thus any maladjustment can be readily located and remedied.

Handling of Adjustments a Feature

A very important feature in the motor coach store-keeping because of constant improvements, changes and experiments, is the proper handling of material which proves defective or upon which adjustments are for any reason obtainable. A tag (Form 43 NET) showing the number of the coach involved, its mileage and the reason for the claim is attached to any such parts by the mechanical department. The storekeeper then reports the matter by letter to the office of the vice-president in charge of purchases and stores, who handles the case with manufacturer or seller. It has been found that by assigning one individual to the handling of material submitted for adjustment, including the preparing of necessary data, the packing and shipping and the follow-up for credits or replacement, this feature can be handled promptly and without loss to the company, whereas other methods bring delays and losses, due to press of more urgent duties on employees involved.

Stores department employees are maintained only at the general stores—garages at Boston, Worcester, New York and other points being served by small sub-stocks shipped from general stores. These sub-stocks are ordered and handled by the mechanical department foreman at each point. He sends requisitions (Form 2-4 NET) for his requirements and disbursement slips covering stock issues, daily. Cash value balances are recorded for each point monthly and inventory is taken by the storekeeper at irregular intervals in order to check balances. Shipments to the foremen at the sub-stock points are made by motor coach, railroad baggage or express.

Service Equipment Handling

Separate from the regular stock account items and handled in an entirely different manner are items covered by the service equipment account, such as magnetos, starters, radiators, axle assemblies, etc., on which exchanges are numerous but actual consumption is practically nil. Such items when removed from coaches are tagged with the main part of a service equipment tag (Form 42 NET) and its stub is presented to the stockman who issues a repaired unit and retains the stub. This repaired unit is installed and the motor coach released. As the defective unit is repaired, material and labor costs are charged to the coach from which the part was removed. When the servicing is completed, the unit is returned to the stockroom, whereupon the stockman matches the stub with the main section of the tag (by number) and destroys both parts. A constant list of available units is maintained and inventoried periodically by the storekeeper.

Tire Records

Tires are inventoried monthly, both in stock and on coaches. Each tire change is recorded on the tire tag. The main part of this tag is attached to the defective tire and goes with it to the tire company. The stub of

the tire tag goes to the auditor, who maintains a record of the location of each tire of our possession. All tires received and tires returned to tire companies are recorded on Form 39 NET and a record of all movements of tires at each stock point is maintained on Form A-105. Copies of both of these forms are forwarded to the auditor for his records.

Repairs by Outside Concerns

Material sent to outside concerns for repairs is identified by a repair tag (Form 26-1 NET). The main portion of this tag is attached to the item to be repaired and remains so attached until the material is returned. It is then detached and held until the invoice is received. The central part of tag is detached by the repairing concern which attaches it to the invoice for the work; the third part is held by stockmen until the repaired item is returned. When the invoice is received with the central part of the tag attached, it is matched with the first and third parts, thus proving delivery. Form 23 NET-3 is used for such invoices as well as for invoices covering storage charges.

The operation of this system for the past eighteen months has proved it to be ideally suited to New England Transportation Company's requirements. It has permitted reduction of inventories and speeding up of turnover, and has taken care of a large increase in units serviced without any increase in stores department personnel or expenses.

EMPLOYEES ENGAGED IN THE MOTOR TRANSPORT ACTIVITIES of British railways recently negotiated a wage and working agreement with the railroad companies. The wage agreement, which became effective on April 15, covers all men engaged in both passenger and freight services on the highways. The section of the agreement prescribing conditions of service, however, does not apply to those engaged in the collection and delivery services within recognized freight station areas.

* * *



One of the Motor Coaches in B. & O. West Virginia Service



Thomas B. Wilson

Southern Pacific Involved in Motor Coach Merger

*Joins with Greyhound, Yelloway and Pickwick Lines
in organizing great holding company—T. B.
Wilson made president*

MERGER of the principal motor coach lines in the territory extending from the central west to the Pacific coast has been consummated, with the Southern Pacific taking the leading part and assuming nominal control of the most important highway lines in the region served by its Pacific system—from Oregon on the north to Texas on the east. In this operation, virtually all of the leading motor carriers in the independent group join their interests to provide a system of motor coach lines covering the entire country.

Three Holding Companies

Under the present set-up, three holding companies will control the activities of a large number of operating companies. On the Pacific coast, the holding company which has just been organized is the Pacific Transportation Securities, Inc. The operating companies controlled are located in the territory served by the Pacific System of the Southern Pacific. Other motor coach lines extending from the Middle West to the Pacific coast, but on routes not paralleling railway lines of the Southern Pacific, are controlled by the newly organized Pickwick-Greyhound Corporation. The network of lines

east of the Mississippi River continues in the control of the Motor Transport Management Company of Chicago.

Control of the Pacific Transportation Securities Company is held jointly by the Southern Pacific, the Pickwick Corporation and the Motor Transit Management Company, each of these having a one-third interest. The Pickwick-Greyhound Corporation is owned jointly by the Pickwick Corporation and the Motor Transit Management Company.

T. B. Wilson Elected President

Nominal control of the Pacific Transportation Securities Company, operating lines exclusively in Southern Pacific territory, is expected to be allotted to the Southern Pacific, T. B. Wilson, vice-president and manager of the Southern Pacific Motor Transport Company having been elected president of the securities corporation. The lines included in this grouping are those of the Southern Pacific Motor Transport Company, the Pickwick Stage Lines, Inc., the Pickwick Stages of Arizona, the Yelloway-Pioneer Stages, the California Transit Company, the Oregon Stages, the Auto Transit



One of the Parlor-Type White Motor Coaches Operated Between San Francisco and Portland, Ore.

Company and the Sierra Nevada Stages. For the present at least these companies will continue to operate under their own names.

Capital, Equipment and Operations of Highway Lines Involved

It is estimated that the merged operations represented in this group have a capital investment of approximately \$30,000,000. More than 1,000 motor coaches are owned, which operate over approximately 35,000 miles of highways. More than 200,000 miles will be covered by these motor coaches daily and it is estimated that the number of passengers carried annually will exceed 10,000,000.

Other officers of the Pacific Transportation Securities company, in addition to Mr. Wilson as president, are C. E. Wickman, president and general manager of the Northland Transportation Company, who is chairman

properly take care of the traffic, two 25-passenger suburban sedan type Mack coaches, with interior compartments for baggage, express and mail, were purchased. The service was then placed on a basis of three round trips daily, Boulder Creek to Santa Cruz, and one round trip daily, Boulder Creek to Felton.

Growth of S. P. Operations

The development of Southern Pacific Motor Transport Company has been steady. On August 1, 1927, street car service in the cities of Salem and Eugene, Ore., was abandoned, these properties having formerly been operated by Southern Pacific, and the substitution of motor coaches was effected. The Salem operation is handled with thirteen coaches (street car type), seventeen regular drivers, and six relief men; while the



A Fageol Coach Used in the Los Angeles-El Paso Service

of the board of directors; C. F. Wren, president of the Pickwick Corporation, who is chairman of the executive committee. Mr. Wren will also be president of the Pickwick-Greyhound Corporation. Officers of the Motor Transit Company are W. E. Travis, chairman of the board of directors, Chauncey McCormick, chairman of the executive committee, and O. S. Ceasar, president.

History of S. P. Motor Transport Company

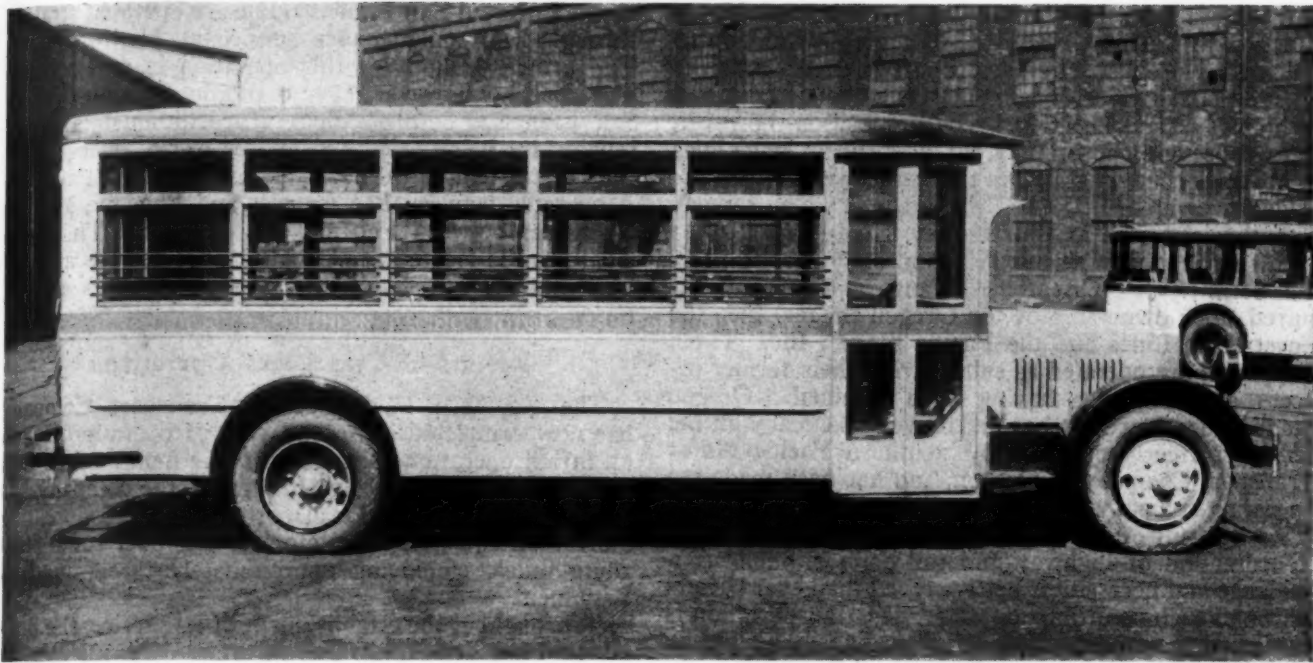
The Southern Pacific Motor Transport Company was incorporated on April 19, 1927. The first operation of the new company was started on May 29 of that year when the Boulder Creek Stage Line, operating between Santa Cruz and Boulder Creek, Cal., a distance of 15.9 miles, was purchased. The equipment of this line consisted of one twelve-passenger motor coach, service being conducted with one driver. Shortly after this acquisition, however, certain Southern Pacific train service in the territory was taken off, and in order to

Eugene service is handled with ten coaches, thirteen regular and three relief drivers.

Oregon Service Comprehensive

The principal highway lines in Oregon were started on September 20, 1927, when substitute service was inaugurated over the following routes: Portland to Ashland, Portland to McMinnville, via Forest Grove; Portland to Corvallis, via Newberg; and Portland to Cook. These operations enabled the Southern Pacific to discontinue a number of unprofitable steam and electric trains. Further development in Oregon has been quite rapid, branch and feeder lines having been established throughout the year 1928, until a substantial network of motor coach lines over the state was obtained.

On December 31, 1927, interstate service was inaugurated between Grants Pass, Ore., and Eureka, Cal., between Medford, Ore., and Weed, Cal., and between Truckee, Cal., and Reno, Nev.



An A. C. F. Coach Operated in City Service in Oregon

A franchise was granted by the California Railroad Commission in December, 1927, authorizing the operation of seasonal motor coach service between Truckee, Nev., and Lake Tahoe, Cal., in substitution for certain steam passenger trains. This service was started in May, 1928, and was operated during that season, and is now being conducted for the current season. On January 1, 1928, the Dunham State Line, operating between Napa and Santa Rosa, was taken over; in July, 1928, the Petaluma and Sonoma Valley Stage Line, between Petaluma and Boyes Springs, was also purchased. This

line connects with the Santa Rosa-Napa line, and has but recently been extended from Petaluma to Vallejo.

Santa Cruz Substitutions

In October, 1928, the California Railroad Commission granted a favorable decision in what was known as the "Santa Cruz case". The Southern Pacific Motor Transport Company had made application to operate motor coach service in substitution for a number of trains in the vicinity of Santa Cruz and on the Monterey Peninsula, over routes as follows: Santa Cruz to Daven-



A Yellow Coach Operated by the Southern Pacific in Train Replacement Service

port; Santa Cruz to Watsonville Junction; Del Monte Junction to Pacific Grove; and Del Monte Junction to Salinas. The substitution as proposed actually involved no additional service, it being merely a change from rail to highway transportation. The proposition, however, met with severe opposition from independent stage lines at hearings conducted before the commission, which extended over a considerable period of time. The service, as authorized, was inaugurated on January 15, 1929.

During the latter part of 1928 and early part of 1929, the Southern Pacific Motor Transport Company acquired stock ownership of the Oregon Stages, Inc., the Coast Auto Lines and the Pacific Stages, Inc. These companies are operated as subsidiaries, their former officers and employes having been retained. Oregon Stages, Inc., however, has taken over practically all the service formerly operated by Southern Pacific Motor Transport Company in Oregon, and has been made the operating company in that state.

As a result of the acquisition of these lines and the co-ordination of highway and rail service, public convenience and necessity is better served than ever before. Through such co-ordination of service, transportation is furnished to outlying points where ordinarily neither an independent stage line nor the railroad could afford to maintain adequate service. The action taken has been very acceptable to the general public.

Operations in the Southwest

To provide a more diversified means of transportation to the traveling public, interstate operations were inaugurated between Portland and San Francisco, and between Los Angeles and El Paso, in November, 1928, the former line being 732 miles in length, while the latter is 1015 miles in length. Also, as a scenic side-trip, interstate service was started between Phoenix, Ariz., and Lordsburg, over the famous "Apache Trail", on a tri-weekly basis, connecting at both ends with through coaches of the Los Angeles-El Paso line. The motor coaches used in these long-distance lines are of the 25-passenger parlor car type, with reclining seats. Coaches

on the Portland-San Francisco line are operated straight through, with maintenance service at Medford, Ore. The principal shop for this operation is at Portland. The coaches, however, have a thorough going-over at San Francisco before being returned, although no heavy repairs are made at that point except in emergencies. Part of the equipment on the Los Angeles-El Paso line is operated between Los Angeles and Phoenix, and the remainder between Phoenix and El Paso. The principal shop is located at Phoenix, while service and repair stations are maintained at Los Angeles and El Paso.

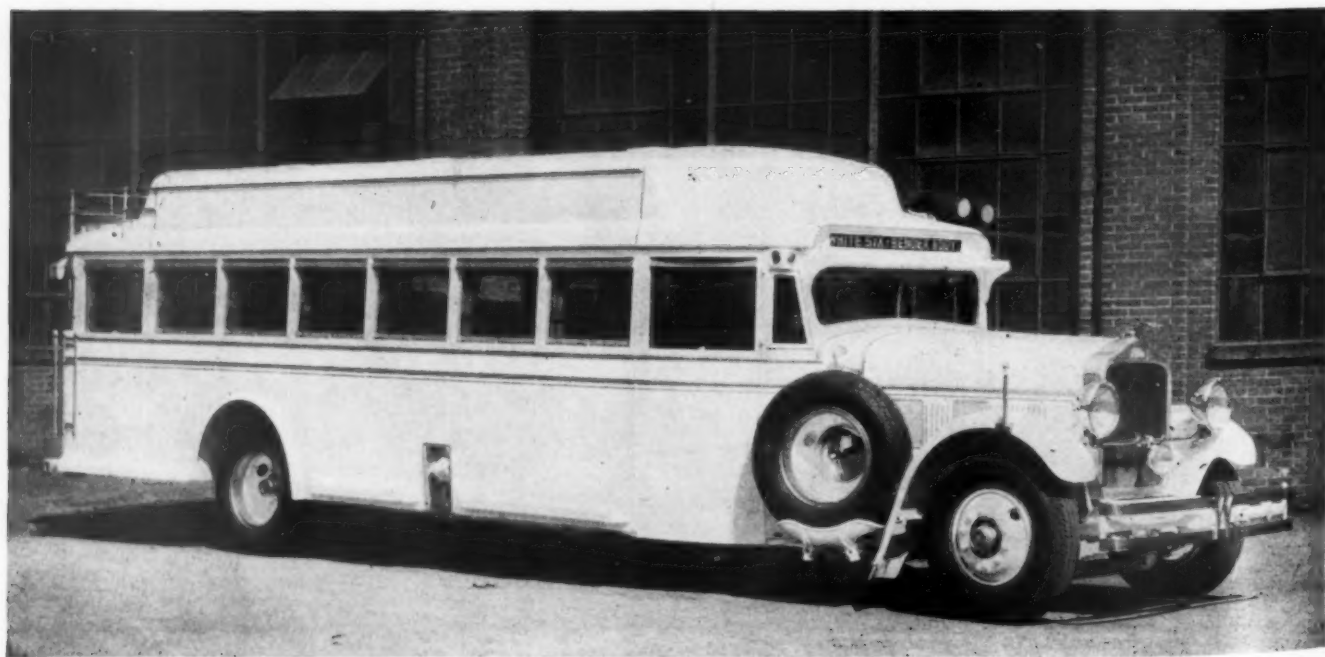
Results of Two Years' Operations

The Southern Pacific Motor Transport Company has now completed its second year of operation. From an infant operation consisting of one motor coach and one driver, over a route of 15.9 miles, the company has grown to an established transportation system, operating more than two hundred motor coaches over some 3800 route miles, employing approximately three hundred fifty men.

"Throughout the establishment of its service, the public need has been the watchword," said Mr. Wilson in a recent statement. "The policy of providing the most up-to-date equipment obtainable, with comfort and convenience of patrons as the first interest, has been strictly adhered to. Drivers have been carefully selected from well-seasoned and experienced men, capable in every respect of handling transportation situations, and of assuming the responsibilities incidental to the safe and efficient movement of vehicles laden with human cargo. The selection of employees is carried on along the same system as used by rail lines, requiring prospective employees to pass physical examinations, etc., and to furnish satisfactory records of previous service.

"The motor coach equipment operated is principally of the parlor car type, ranging from 12- to 29-passenger capacity. We recently placed in operation three of the 40-passenger parlor car type coaches, for service in the commuter district around Portland."

* * * *



White Six-Cylinder, 33-passenger Motor Coach, with Inside Overhead Baggage Compartments



Operation of this Motor Coach Saves Central of Georgia \$15,000 a Year

Motor Vehicles

Cut Operating Losses

Central of Georgia expects annual savings of \$50,000 in recent substitutions of highway services for unprofitable trains

THE Central of Georgia, through the operation of three motor trucks and three motor coaches in substitution for train services, anticipates an annual saving in operating expenses amounting to approximately \$50,000. These highway vehicles are owned and operated by the railroad's subsidiary, the Central of Georgia Motor Transport Company. While all operations, save one, were inaugurated within the past few months, present indications are that the expected savings will be realized in each instance.

Motor Trucks Handle Peddler Car Traffic 155-Mile Division

The three motor trucks, which are expected to yield an annual saving of approximately \$15,600 are in l.c.l. freight service along the line between Columbus, Ga., and Birmingham, Ala. This is a run of about 150 miles on which four local freight trains formerly operated each day. These trains operated between each of the termini and Goodwater, Ala., a point about midway. Train No. 81 ran from Columbus to Goodwater and train No. 83 from Goodwater to Birmingham. In the

opposite direction train No. 84 operated from Birmingham to Goodwater with train No. 82 running from Goodwater to Columbus.

The distance between Columbus and Goodwater is 84 miles and between Goodwater and Birmingham 71 miles. Each of these four trains formerly averaged about 2 hr. 20 min. overtime a day. Under the new plan they are run through from Columbus to Birmingham and Birmingham to Columbus without splitting at Goodwater. This is made possible by the motor truck handling of local l.c.l. freight since, for the elimination of this work, the trains can get over the entire division—155 miles—with but 2 hr. 30 min. overtime each.

Plan Saves 90 Miles of Train and Engine Crew Mileage Daily

No actual train miles are saved since the two through trains now operate the same mileage as did the previous four. The saving, however, comes in the release of equipment, the lessened per diem charges and in the mileage paid train crews. Four crews were formerly paid on the less than 100 mile rate whereas now only

two crews are employed and are paid at straight mileage rates for miles actually run. The net result is a saving of 90 miles a day in the mileage paid train crews.

The plan also releases two Mikado type locomotives for other service. The per diem savings come from a delivery of west bound cars two days earlier at Birmingham and eastbound cars one day earlier at Columbus. These savings are included whether or not the cars are delivered to a foreign line as the \$1 a day charge is considered proper in all instances inasmuch as the earlier release of the cars from the particular run increases their earning days on other runs regardless of whether these latter are home or foreign routes.

The two-day saving in per diem on westbound cars is brought about in the following manner. Under the previous arrangement westbound cars came into Goodwater from Columbus and remained there for a day before proceeding to Birmingham. Furthermore the Goodwater-Birmingham train which hauled these cars to the latter point arrived after the time at which per diem was assessed for the following day. On the through runs the one day layover at Goodwater is eliminated and in addition the train delivers its cars to Birmingham connections before the time for the assessment of the next day's per diem. On eastbound cars the per diem saving of one day comes from the elimination of the layover at Goodwater. The train from Goodwater to Columbus had always arrived at the latter point in time to prevent the assessment of an additional day's charge on its cars.

For the handling of local l.c.l. freight on the run, three concentration points were established and a truck was assigned to each. Two Internationals and one White are in the service. The concentration points are at Opelika, Alexander City and Sylacauga, Ala. The truck at each of these centers serves stations within approximately 30 miles in each direction. The l.c.l. freight consigned to these latter stations is loaded into cars which are set off and their loads broken for truck delivery at the three concentration and break-up points named. Conversely, freight is collected by the trucks at the smaller stations and hauled into the concentration points for loading into merchandise cars. Truck movements are from station to station only; no store-door service is available.

The Opelika concentration serves the five stations of Smiths, Motts, Bleecker, Salem and Chewacla to the east and North Auburn, Gold Ridge, Waverly and Spinks to the West. The first station between Columbus and Ophelia is Phenix City, a distance of 2.1 miles out of Columbus. A switching engine operating out of the latter handles l.c.l. movements to Phenix City and thus permits the Opelika concentrations to start at Smiths.

The Alexander City concentration serves the 11 stations between Spinks and Parkdale, including the latter; the Sylacauga concentration covers the territory between Parkdale and Vincent, including the latter. From

Vincent, the last station of the Sylacauga concentration, to Birmingham it is approximately 34 miles. It was found unnecessary to establish a concentration point in this territory where only carload business is handled.

As the service only commenced on May 1 no definite figures on cost are available. Furthermore it is pointed out that experience may develop the desirability of some shifts of present concentration points or alterations, in present trucking area boundaries. The daily truck mileage is at present approximately 270 or the equivalent of 90 per truck. As was stated in the foregoing, the plan is expected to result in a monthly saving in operating expenses of approximately \$1,300 or \$15,600 a year.

Terminal Interchange at Atlanta and Savannah

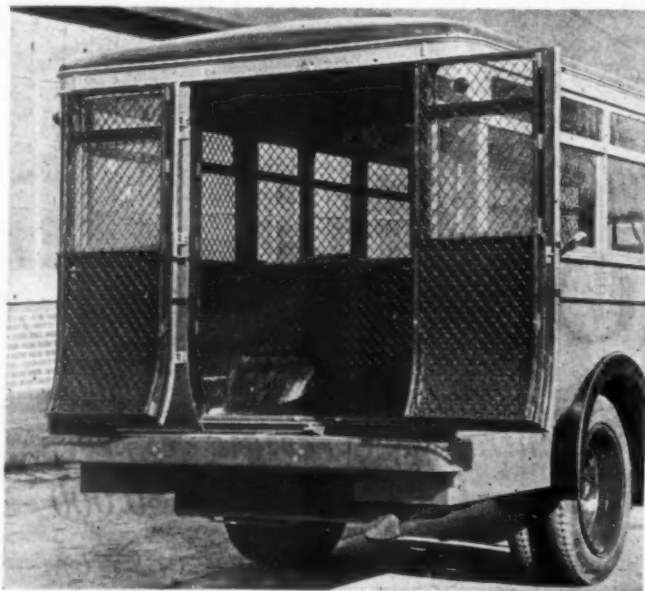
Other highway freight operations of the Central of Georgia are the terminal interchange services at Atlanta and Savannah. The latter is performed by railroad owned tractors and trailers and was inaugurated several years ago. It is an interchange service between

the central of Georgia rail terminal and the waterfront terminal of its subsidiary, the Ocean Steamship Company. The Atlanta operation commenced February 1, 1929, when the Central of Georgia entered into a contract with a trucking company in that city for the handling of its l. c. l. freight interchange with other carriers. This contract is on a per ton basis with no guaranteed minimum. The trucking service was installed mainly to speed up the handling of l.c.l. since the time consumed in box car interchange had been from two to three days. The truck service permits a transfer of the freight the same day it is

received, which means that it is also loaded out to destination on the same day. This business amounted to approximately 200 cars a month and these are now released for other service. It is estimated that this Atlanta trucking plan will save about \$300 a month, including the saving in per diem and in the lessened handling of cars by switching movements.

The Central of Georgia Motor Transport Company's first motor coach route was established in January, 1928, between Perry and Fort Valley, Ga., a distance of 12.5 miles. The service was installed to displace an unprofitable train service. The coaches operate three daily round trips on the former train schedule and handle all mail, baggage and express. A specially designed Mack unit with rear compartment for this package handling is used on the run. This operation and the specially designed coach were described in articles appearing in the *Motor Transport Sections* of January 28, 1928, and April 28, 1928. The saving in operating costs over the former train service is about \$9,600 a year.

Since the first of the current year, however, two other motor coach routes have been established. The first of these was inaugurated on February 20 between Opelika



Baggage Compartment of the Perry-Fort Valley Coach



One of the Internationals in L.C.L. Service

and Roanoke, Ala., a distance of 43 miles. This highway service was substituted for a former rail passenger service and the daily passenger and freight trains on the run were combined into a mixed train. One Yellow parlor type motor coach which makes a daily round trip is used on the route. This coach is a 29-passenger unit, reduced to 25 to provide an inside mail compartment in the rear. Only first class mail in locked pouches is carried, since express and other mail is handled on the mixed train. The service is confined to station-to-station movements and is expected to produce net annual savings of \$8,500 over the former train operating costs.

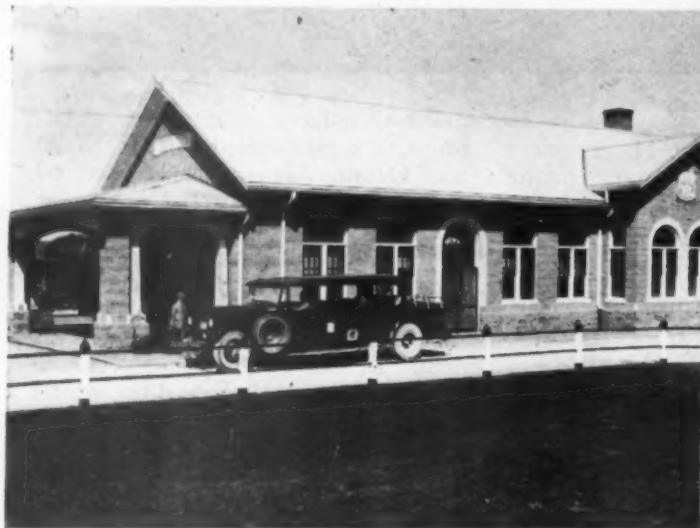
The remaining route was established on March 20 between Eufaula and Ozark, Ala., a distance of 64 miles. Like the operation discussed in the preceding paragraph this also displaced an unprofitable train and makes one daily round trip on the former train schedule. A 29-passenger Mack motor coach with a Bender body is used. The passenger-carrying capacity of this vehicle is also reduced to 25 to provide a baggage, express and mail compartment. In this instance, however, the motor coach handles not only first class mail but parcel post, baggage and express as well. Estimated savings in this case are placed at approximately \$15,000 a year.



The White Unit of the L.C.L. Truck Fleet



A Party of Tourists En Route



Where Road and Rail Meet

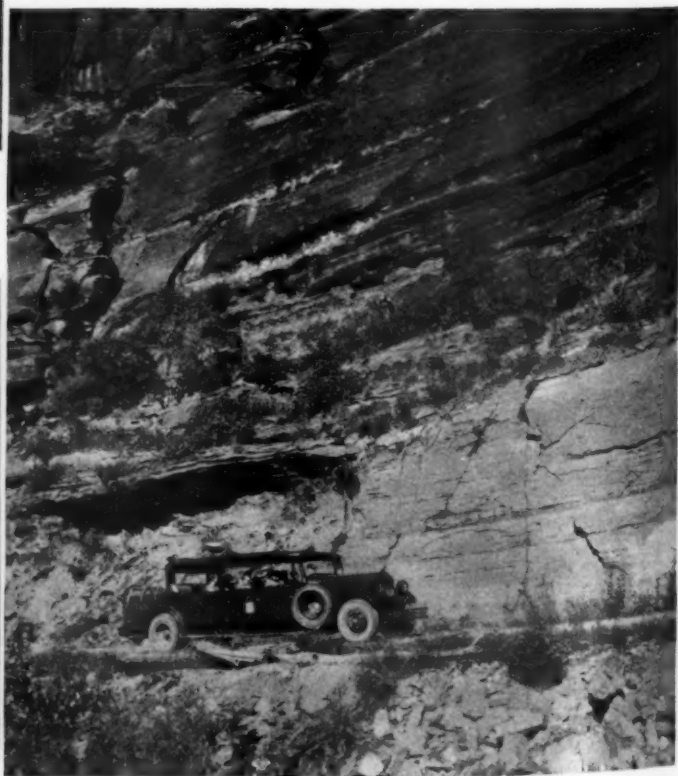


The Motor Coach Is a Six-Cylinder White

Seeing Zion Park in

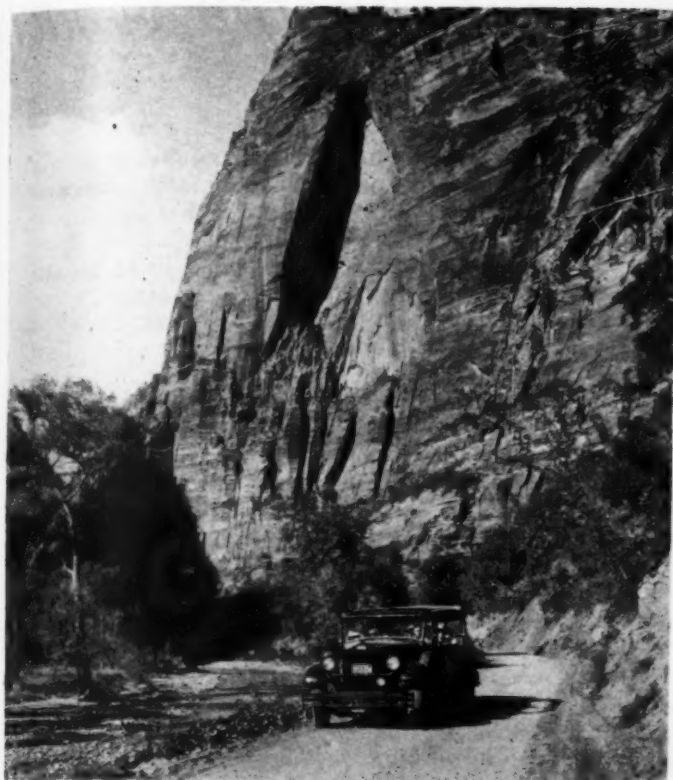


Crossing a Mountain Brook

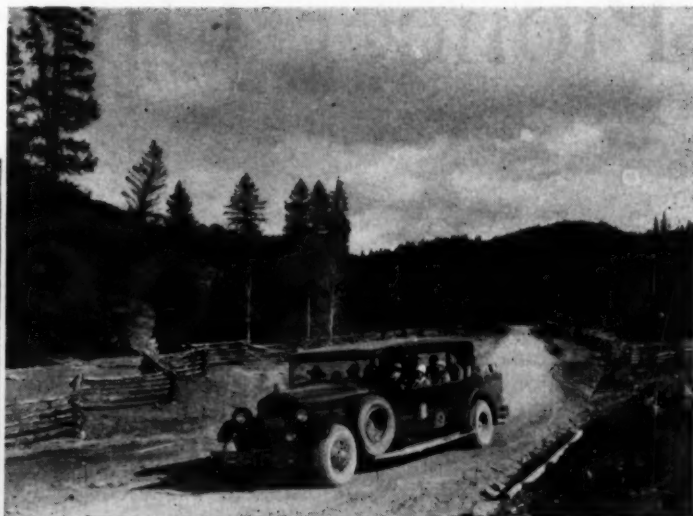


The Motor Coaches Are Operated by the Utah Parks Company, a Subsidiary of the Union Pacific

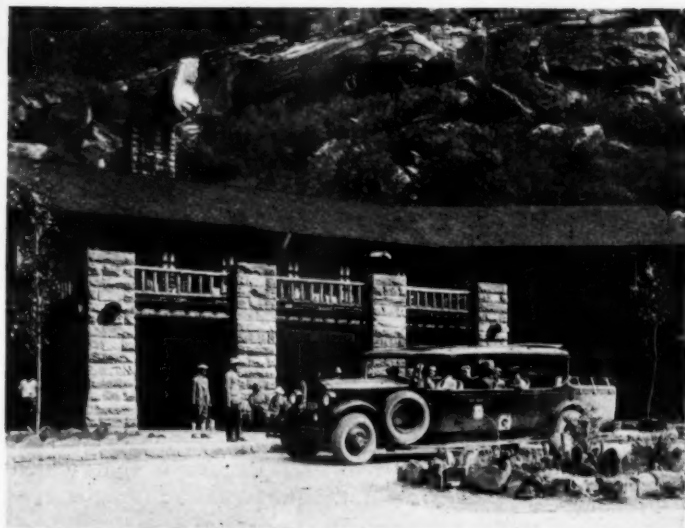
Union Pacific Coaches



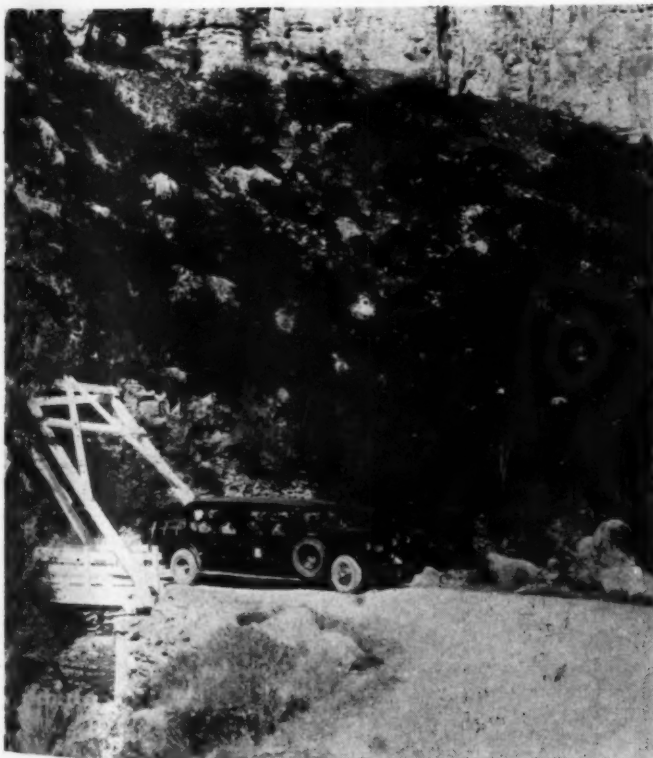
Flame Colored Cliffs Are the Walls of the 15-Mile Zion Canyon



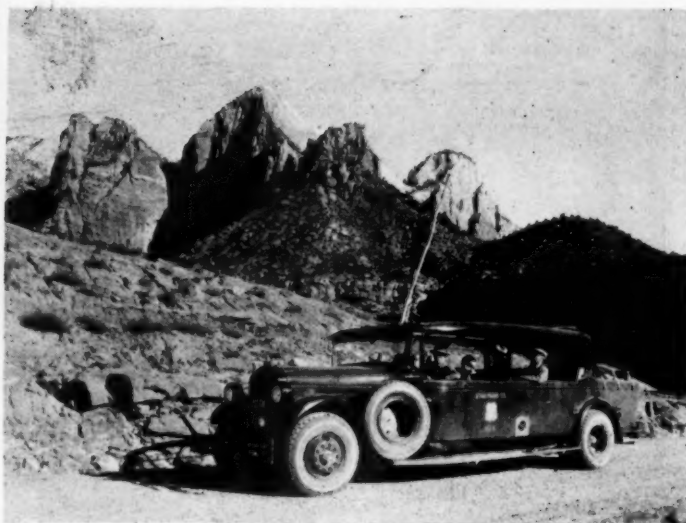
On the Road in Cedar Canyon



A Motor Coach Party at Zion Lodge



The Union Pacific's New Hotel at Bright Angel Point Opens This Month



Multi-Colored Cliffs, 2,500 ft. High, as a Background

Pioneer Operators

of Motor Coaches

OFFICERS in charge of the motor transport operations of two New England lines which have had relatively long experience with this form of transportation service, told what their companies had done and what results had been achieved to members of the New England Shippers' Advisory Board at their annual meeting in Boston, Mass., on March 28. The railway officers were A. P. Russell, executive vice-president of the New Haven, and president of the New England Transportation Company, and H. F. Fritch, passenger traffic manager of the Boston & Maine, and president of the Boston & Maine Transportation Company. The B. & M. began to engage in the operation of motor coaches in 1924, and a similar step was taken by the New Haven in the following year. Both of these roads are now carrying on their highway operations on an extensive scale, the New England Transportation Company, with nearly 300 motor coaches in service, being one of the largest motor coach operating companies in the United States. In their addresses, which are abstracted below, Mr. Russell and Mr. Fritch give a comprehensive picture of the work being done by their highway transportation companies.

New Haven Motor Coaches Offer Four Classes of Service

By A. P. RUSSELL

Executive vice-president, N. Y., N. H. & H.
President New England Transportation Company

We have four classes of service: first, that which was organized strictly for the purpose of saving opera-

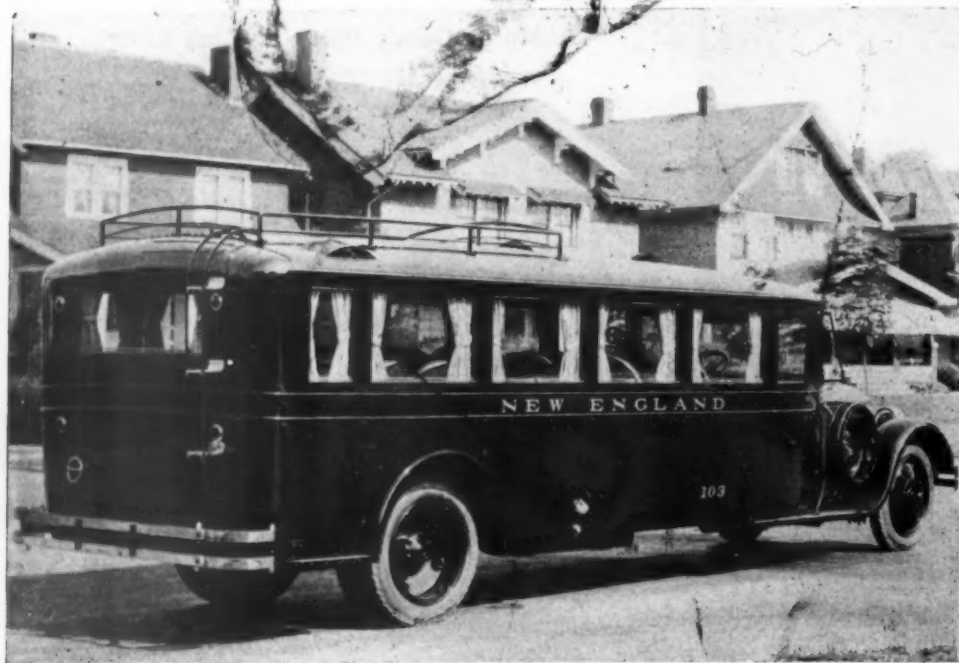
tions on the rails—what we call "rail-saving lines"; second, a class of service which is rated as supplemental to rail service, and which was designed for the purpose of meeting the competition of the independent lines. Then we have a third class of what might be termed "policy routes," which we are obliged to operate, sometimes at a loss, in order to maintain certificates which we have received on more profitable lines. And then we have a fourth class of service, and one that is increasing very fast—that rendered to chartered-coach parties.

Our first operation commenced on August 10, 1925, in the western part of the State of Connecticut, taking the place of passenger operation on one of our branch lines. We are now operating 61 distinct routes. Twenty of these are "rail-saving," operated at a loss of substantially \$125,000 a year, because we have felt it necessary to carry out the obligation of rendering a cheap class of community service.

In all, we are operating over 2200 route miles. We operate nearly 300 motor coaches. We have four operating divisions, divided by each of the state lines. One of these, however, covers the line between Boston and New York. Rail tickets are accepted on these lines. We check baggage, and we have connections, so far as necessary to serve the public, at all important rail points. In 1928, we operated 9,000,000 coach miles, and we anticipate that in 1929 we will increase that to upwards 10,000,000 coach miles. In 1928 we carried 5,500,000 passengers, and estimate that in 1929 we shall probably carry 6,500,000 passengers.

We operate, roughly, 850 distinct schedules every day, and during the year 1928, the coaches operated 96 per cent on time. The cost of operation is about 29½ cents a mile, plus the gasoline tax which is now operative in the several states. Last year, we consumed a million and three-quarter gallons of gasoline. We have at Providence what is probably one of the largest garages and shops operated by any individual company in the country. We have adopted the unit replacement system, keeping spare parts and spare engines, which are always in condition, so that when we have an engine failure, it is corrected by putting in a new engine, and the coach is out of service less than 24 hours.

We also have jointly with



and Trucks Say:



the Connecticut Company, large shops and garages at Hartford and New Haven. We have, I believe, tying-up points for equipment at something like 35 different points within New Haven territory. We are very careful not to operate beyond the territory served by the New Haven itself.

Every line that we operate is under the jurisdiction of a commission. We found that the failure of the independents in the early days was due to the fact that they had not placed themselves under the jurisdiction of the public authorities, and we have, in some cases, even begged various commissions to recognize our position with regard to interstate lines and take jurisdiction over our operations. In my opinion this has been a success, because it has given us added protection. It has given us an opportunity to comply with the rules and regulations of the various state commissions, and also to operate with a degree of safety, which otherwise we would have been unable to do.

Safety Paramount

We have three cardinal points in connection with our instructions to our motor coach operators, who are the ones who really come in contact with the public—cardinal points that are not overlooked a second time. We have a very definite rule in regard to speed. We do allow five miles, an hour, additional; but if the red arrow goes up on the speedometer, it can't go back, and if the red arrow goes above thirty miles an hour, the driver of the car has to explain when, where, and why it went there.

If one of our drivers is reported to have been crowding anybody off the highway, he is never reported a second time. Another cardinal point is that there shall always be care for the safety of the public, irrespective of what may happen, and, in addition that there shall always be extreme courtesy, not only to those who are using the same highways in either direction, but also to those who are using our

"The use of these vehicles by a railroad is exactly comparable to any manufacturer using the latest and most up-to-date machinery and processes in order that he may turn out a well-made product that is up-to-date, that will sell at a reasonable price and that will make him a profit."

service. We thought at one time that these rigid instructions might slow up our operations, but running on an exact schedule, the same as the rail service, with examinations, physical examinations, eyesight examinations, etc., it has been surprising to us, even with the bad weather that we encounter from time to time, that only 4 per cent of our operations in 9,000,000 miles have been off mittee representing the railroads schedule.

As the chairman of the committee of the country, I have had more or less to do with the movement attempting to arrange that federal legislation should be passed regulating the use of highways in interstate traffic. In the various measures we have been introducing in Congress, each and every one has contained a provision to protect those now operating. It is what we call the "grandfather" clause. We are operating so extensively now that little by little we have become the "grandfather," and have taken that place against a great deal of opposition of those originally operated, but without any public regulation.

Boston-New York Service Successful

With that "grandfather" clause in mind, we thought it would be proper to operate between Boston and New York. Most everybody expressed the thought that there was something wrong in our heads—operating a line between Boston and New York in competition with our own rail service. We put this line on originally so that it would be in existence when Congress finally decided to take jurisdiction, but the patronage on it has grown so tremendously that we are now operating several coaches between the two cities.

One of our best schedules is on the line operating between Boston and New York, leaving here at 10 o'clock in the evening and arriving in New York in the morning. It is well patronized, and it has been surprising to us that the seating capacity is generally sold to about 95%.

We find that the prin-



cial thing that brings about proper operation is the establishment of terminals. We have a terminal in Boston near the Copley Plaza, at the Motor Mart, off the highway. Waiting rooms are substantially the same as, and if anything a little better than those in some of our better stations, and we are adopting the plan that is used in Providence, Hartford, New Haven, and other points, and particularly at New York, of operating from terminals which are not upon the highway.

Contemplate Similar Truck Service

That, in a general way, is, as briefly as I can state it, the history of the operation of the highway passenger service of the New Haven. We have not as yet operated anything on the highways in connection with freight, but I don't think I would be betraying any confidence if I stated that we are considering doing so. We are considering adopting the same methods in regard to the transportation of freight that are used by those who are competing with us. We are contemplating co-ordinating a highway and steamship service, particularly from points in southern New England to our ports at New Bedford, Fall River, and Providence. Whether that will develop any further, we do not know.

Motor Coaches and Trucks Help the Boston & Maine

By H. F. Fritch

Passenger Traffic Manager, B. & M.
President, Boston & Maine Transportation Co.

The Boston and Maine in 1924 adopted the policy of using highway transport in connection with its rail operations where it could be done to help in better serving the public and in increasing the efficiency of operation. The Boston and Maine was a pioneer among railroads in using this agency in freight and passenger service. More recently railroads throughout the length and breadth of the country have been proceeding along similar lines and in some instances on a very large scale.

The geography of the Boston and Maine system results in short hauls, and has made it particularly susceptible to the competition of the private automobile and motor truck. These vehicles have taken passenger and freight traffic in large volume, leaving many local services lightly patronized and capable of being provided by units smaller than the steam train. Passenger miles have decreased 375,000,000, or 37 per cent, since the peak business of 1920.

The operations of the Boston & Maine Transportation Company have now expanded so that a maximum of 175 motor trucks and 111 motor coaches have been used in carrying on its operations.

How Motor Coaches Are Used

Motor coaches are being used in a variety of operations, but principally to replace light trains, to supplement rail service, as feeders, and on interstate runs independent of train service where there is no regulation today of the motor coach operators. In our four years of motor coach operation, costs have exceeded revenue; but these losses have been offset many times by the savings which the railroad has been able to make as a result of motor coaches taking the place of rail service. These savings have amounted to over half a million dollars.

The inroads of the private automobile have resulted in many local services being so lightly patronized as to make steam train operation an extravagance. The use

of the motor coach affords a means of continuing such services at a reasonable cost, rather than discontinuing them entirely. In some instances where there is sufficient patronage, it has been possible to increase the frequency of service by using the motor coach in place of the more expensive rail service. This type of operation is one of the most interesting and valuable to the public and to the railroad.

In other instances it has been desirable to eliminate stops of through trains in order to speed up the service, and the motor coach affords a means of providing the local service, tying in with the main line trains at important points.

There is no commission which has jurisdiction over interstate motor coach lines at the present time. This has made it necessary for the railroads, in order to protect its interests, to operate motor coaches in such services as that between Boston and Portland. We sincerely hope that Congress will pass legislation placing the regulation of such operations under the Interstate Commerce Commission. It is unfair for the regulated railroads to have to compete with unregulated motor coach lines.

In order to round out its service in accordance with the policy of providing all of the organized transportation service required in its territory, the B. & M. Transportation Company last summer inaugurated a series of all-expense tours through Massachusetts, Maine, New Hampshire and Vermont. These tours were extensively advertised and a fair business was done, and it is expected that this year the volume of business will be considerably greater. Such service as this should react to the benefit of the recreational industry in our territory.

Last year approximately two and one-half million motor coach miles were operated by the Transportation Company, with a revenue of approximately three quarters of a million dollars.

Benefits of Motor Truck Operation

Motor trucks are being used where their fundamental characteristics make them useful in improving service and operating more economically.

One of the important uses of the motor truck is in the transfer of freight between terminals in Boston. This is not, of course, a new use for this vehicle, but having the service performed under the direction of one unit coordinated with the railroad has been an improvement. A number of ferry cars have been eliminated by substituting motor truck service, resulting in improved service and economy to the railroad.

One of the most interesting operations has been the use of the motor truck to concentrate freight at central points so that through-merchandise cars could be made up. The principal concentration points for these operations are Boston and Lawrence, from both of which through-merchandise cars are operated to many off-line destinations. The same principle is applied to freight moving in the reverse direction, and such freight comes in through cars to the various concentration points, where it is unloaded and trucked to destination stations.

The handling of less carload freight from station to station has been beneficial to the Boston and Maine in a number of ways. The service has been speeded up to such an extent in many cases that traffic has been recovered from long distance trucking companies; a saving in the use of freight cars has been made, a saving in terminal switching, a saving in car space at the larger freight houses where car space is at a premium,



and a saving in train operations, through the elimination of certain local trains and the speeding up of others, resulting in either the reduction of overtime or the extension of local freight runs with a consequent reduction in the number of local freight trains operated.

Trucks have been substituted for rail service for the movement of less carload freight on the following lines except at the larger centers: Boston to Portland, via Dover; Boston to Portland, via Portsmouth; Boston to Manchester, N. H.; Boston to Fitchburg; Boston to Saugus; Boston to Medford; Boston to Woburn; Boston to North Billerica; via Bedford; Boston to Watertown; Montvale to Stoneham; Salem to Marblehead; Beverly to Gloucester; Hamilton-Wenham to Essex; Salem to Wilmington Junction; Peabody to Danvers; West Peabody to Newburyport; Georgetown to Haverhill; Lowell Junction to Lowell; Lawrence to Man-

chester; Newton Junction to Merrimac; Portsmouth to Raymond; Portsmouth to Milton, via Gonic; Portland to Nashua; Lowell to Ayer; Concord, N. H., to Newport; Concord to Penacook; White River Junction to Westboro; and North Adams to Williamstown.

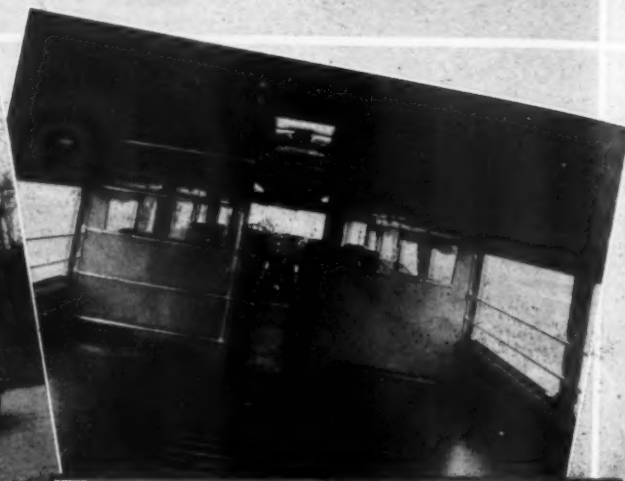
In addition to these operations, a certain amount of independent over-the-road trucking is being done, and at some localities a store-door delivery is provided.

The use of these vehicles in such services by a railroad is exactly comparable to any manufacturer using the latest and most up-to-date machinery and processes in order that he may turn out a well-made product that is up-to-date, that will sell at a reasonable price, and that will make him a profit. The Boston and Maine is doing better, as we hear on all sides. It is not because of greater revenues, but because lower revenues have been more than offset by efficiencies in operation.

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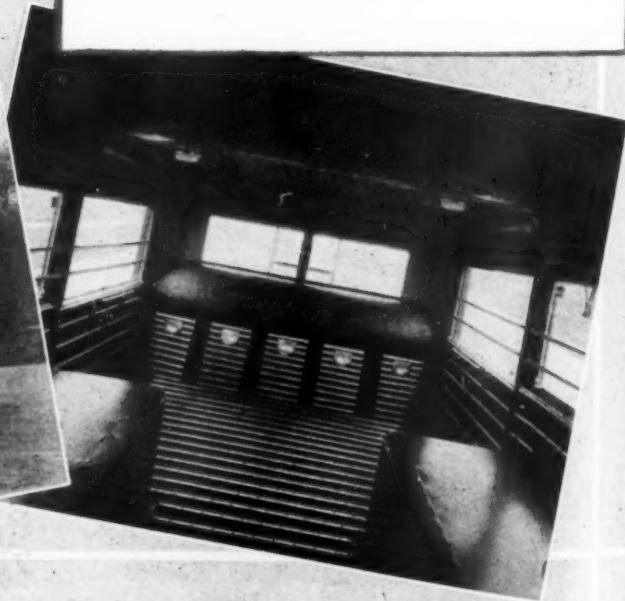


Mack Truck and Trailer



The Milwaukee's Newest Motor Coach

The Chicago, Milwaukee, St. Paul and Pacific recently placed this type W Yellow coach in service on a route paralleling a branch line on which train service had been reduced. This coach has a special body with a compartment at the rear capable of accommodating a considerable quantity of mail, express and baggage, or in emergency passengers for whom there is not sufficient room in the forward section.





Rio Grande Motor Coach Operated in San Luis Valley

Is Motor Coach Operation Profitable?

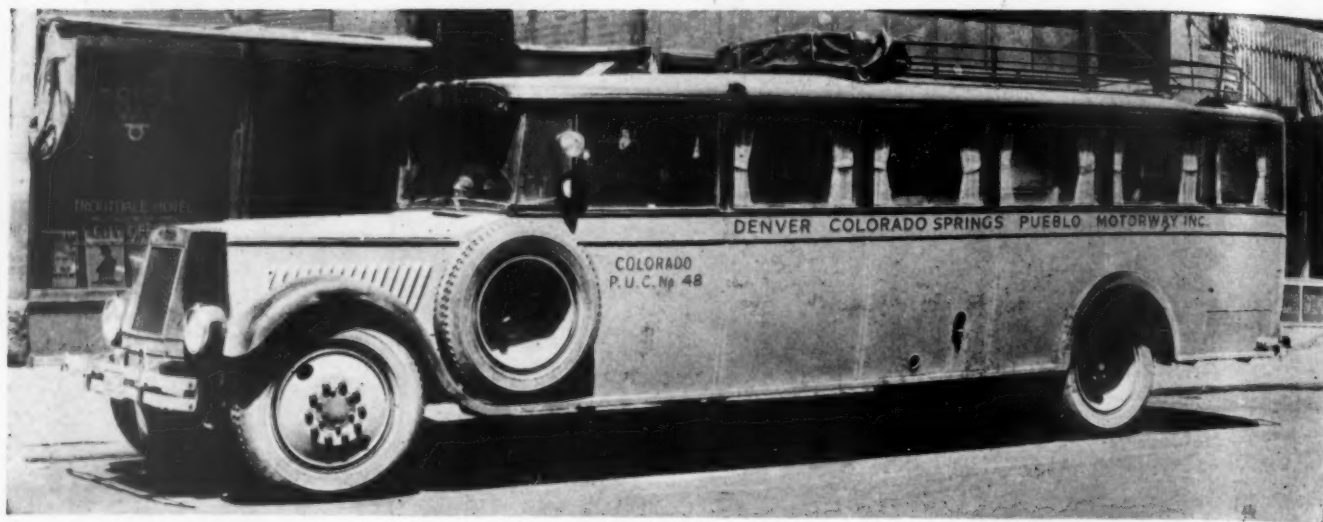
Denver & Rio Grande Western, with three years' experience on highways in its territory, finds that it is

ONE of the railways which has been most successful in the operation of motor coaches and motor trucks, to supplement and in some instances to replace its train service, is the Denver & Rio Grande Western. It began its operations on the highways in April, 1926, and since that time has found the venture profitable from several standpoints. Although it has not established a particularly extensive system of motor coach and motor truck lines, it has gone ahead steadily since the beginning, putting on highway service where it has seemed most necessary, until it now has between 700 and 800 miles of highway lines, centering in four separate localities. In each locality is a separate subsidiary of the railway which carries on the motor transport operations in its particular territory. Each of these subsidiary companies, with operations relatively small in extent, requires only a small organization, and overhead expenses are kept at a minimum. Although several of the motor coach and truck lines operated are in territory which on account of topographic conditions, would not be considered conducive to low operating expenses, the operating cost per mile of the D. & R. G. W. motor coaches compares favorably with the cost of operation of motor coaches in other parts of the country. For example, during a representative period, the cost of operation of motor coaches between Denver and Pueblo was 22.3 cents per mile. On another line, the operating expenses, including all charges, were 20.1 cents per mile.

Early in 1926, the Denver & Rio Grande Western began to feel keenly the competition of private automobiles for traffic between Denver, Colorado Springs and Pueblo. The railroads in this territory also were incurring some losses as a result of the competitive service rendered by independent motor coach operators over the excellently-maintained highway between these points. It was concluded by the D. & R. G. W. and the Colorado & Southern that they might regain and conserve some of the revenue incident to this traffic through the acquisition of a controlling interest in the motor coach company holding a permit covering this route.

Consequently, the Denver-Colorado Springs-Pueblo Motor Way, Inc., was organized, and it began operation on April 25, 1926, with six motor coaches in service. The inauguration of this highway passenger service did not enable any saving in train service between Denver and Pueblo. On the other hand, it did show a fair return on the investment in the property, showing a net income of \$8,886 for the first twelve months of operation, or a return of 14.8 per cent on the investment in the line. This favorable condition has continued.

The operation between Denver and Pueblo shows a fair return over the twelve-months period as a whole notwithstanding net losses which are incurred during the winter and early spring months. The officers of the Denver & Rio Grande Western find it difficult, however, to predict the results which will be secured in the future on this line on account of the increasing travel



One of the Six Cylinder Mack Denver-Pueblo Motor Coaches

between Denver and Pueblo in private automobiles.

In the vicinity of Grand Junction, Colo., which is a point on the main line of the railway west of the continental divide, the Denver & Rio Grande Western has another motor coach and truck operating subsidiary, the Western Slope Motor Way, Inc. This subsidiary began operation on May 31, 1926, between Grand Junction, Colo., and Montrose, a distance of 68 miles. In addition, motor coach service was provided between Delta, Colo., and Somerset, a distance of 43 miles.

Both freight and passengers are handled by the motor coaches and trucks of the Western Slope Motor Way, between Grand Junction and Montrose, and also between Delta and Somerset. This has made possible the discontinuance of passenger service on the so-called North Fork Branch, between Delta and Somerset, except from July 1 to October 15, each year, when the heavy express movement of fruit and vegetables requires a regular passenger train. The saving, as a result of the taking off of this passenger service, approximates \$7,000 per year. In addition to this saving, the Western Slope Motor Way operations are profitable in themselves, a fair return being earned on the investment both in the motor coach and truck service.

Motor coach and truck operations in the San Luis Valley, between Alamosa, Colo., and Salida, are carried on by a third subsidiary, the Rio Grande Motor Way, Inc. These highway lines serve the territory previously cared for by a narrow-gauge passenger train, and supplement the present one-round-trip-weekly freight train service between Alamosa and Salida. The highway subsidiary also handles freight and passengers by way of Saguache, which never had train service. The Rio Grande Motor Way began operation April 15, 1927.

The highway service which it provides has enabled the discontinuance of a passenger train between Salida and Alamosa, with a net saving to the Denver & Rio Grande Western and approximately \$4,000 per annum. This allows for all the revenue accruing to this train, as well as for the out-of-pocket expenses saved by reason of the taking off of the train. The altitude of this locality and snow conditions occasionally affect the motor coach and truck operations adversely, necessitating the periodical reinstatement of the passenger train.

The Denver & Rio Grande Western recently organized a new subsidiary, the Rio Grande Motor Way of Utah, Inc. Through this company, application has been made to the Public Utilities Commission of Utah for a certificate of public convenience and necessity to per-

mit the operation of motor coaches and trucks in passenger and freight service between Salt Lake City, Utah, and Marysvale. The distance by rail between these points is 208 miles, and by highway, 225 miles. This application is still pending before the Utah commission.

Since March 21, 1929, the Rio Grande Motor Way of Utah has been operating a combination motor coach, handling passengers, mail and express, between Provo, Utah, and Silver City, a distance of 65 miles. The operation of this coach has made possible the discontinuance of a regular passenger train between Salt Lake City and Silver City. While it is known that there is some net saving to the railroad in out-of-pocket expenses, as a result of this replacement of train service by motor coach service, it is impossible to estimate the results of the Utah operations until the more extended proposed service has been inaugurated and has been under way for some months.



Along the "Million-Dollar Highway" Over Which One of the D. & R. G. W. Motor Coach Lines Is Operated



Insuring Safety in Operation

Methods which have enabled the Boston & Maine Transportation Company to build up an enviable record for accidentless service

By R. J. Littlefield

Manager, Motor Coach Service, Boston & Maine Transportation Company

THE two first sentences in the Railroad Rule Book might also be the two first sentences in the Motor Coach Rule Book:

- (1) Safety is of the first importance in the discharge of duty;
- (2) Obedience to the rules is essential to safety.

The success of highway operations depends largely on the "man at the wheel." His problems are in many ways similar to those of the "man at the throttle," but his job carries with it responsibilities similar to those of the railroad conductor, trainman, and baggage master combined.

Recognizing the importance of having the right man at the wheel, the Boston & Maine Transportation Company exercises extreme care in the selection and training of operators. Applicants are first given a thorough physical examination by the company physician. If this examination is passed satisfactorily, the inspector or superintendent of the division spends as much time as is necessary to qualify the applicant on the operation of a motor coach. All instruction runs are made without passengers. Special attention is given to the shifting of gears and the handling of the car on grades, at street intersections, and at other dangerous points. After the applicant is capable of handling an empty coach, he is assigned to a route with a regular operator.

When the new man has been prepared to enter revenue service, he first operates under the direction of a regular operator until the latter is satisfied as to his

qualifications. The regular operator then gives to the inspector or division superintendent a statement showing that the applicant is qualified to handle cars in revenue service. No compensation is allowed during the qualification period.

Meanwhile the new operator has been studying the existing bulletins, tariffs and rule books. On these he must pass an oral examination. He then reports to the foreman of the mechanical department, who gives special instructions in some of the mechanical workings of the coach. These instructions include the proper method of starting motors, the use of brakes, radiator covers, chains, and other appliances, as well as the importance of the defect card. He is even instructed in the correct way of handling tires.

While he is qualifying on the coach operation, his references, furnished with his application for employment, are checked. If any undesirable features are found in his past record he is promptly released.

After the foreman of the mechanical department passes the applicant, he is given detailed instructions as to the making out of reports. On one division, the superintendent has the applicant make all reports on regular runs, while qualifying, and checks them with those received from the regular operators.

As soon as the man is thoroughly qualified, he is measured for a uniform, which consists of cap, coat, trousers, and puttees. The cost, about \$35, is deducted from his pay at the rate of \$5 per week.

When assigned to a regular run, the new man is watched carefully and his performance is checked frequently to make sure that he is handling cash and ticket collections properly and operating in accordance with the rules and regulations. It is a mistake to put new men onto the highways without giving them special attention from time to time to make sure they get the benefit of previous experiences in meeting the many problems which have developed in highway service during the past few years.

Checking Driving Speed

There are many mechanical devices for the checking of motor coach speed. We have used them but we believe that proper supervision and discipline will do more to develop efficient operators than mechanical devices. It is advisable, however, from time to time to check the driving habits of all men. As a rule, a careless driver will show the same carelessness when supervisory men are riding with him. Occasionally it may be necessary to check an operator without his knowledge, in order to protect the records of the division against the man who is careful only when he thinks he is being watched. Such men are rare, but one or two will spoil the good record of a whole division.

Highway operations, generally speaking, must be guarded by the same rules and the same good judgment as rail operations. One of the contributory causes of rail accidents is the failure properly to regulate the speed of trains and engines to meet conditions in places where the way cannot be seen and is not known to be clear. Likewise, on the highways, speed control is extremely important where traffic is heaviest and congestion most frequent, and at points where the highway ahead cannot be seen. In the interests of safety, motor coach operators are instructed to disregard schedules when necessary and to observe all motor vehicle laws. We do not authorize operators to maintain their "rights of the road." They must be mindful at all times of the "other fellow." They must stop at all railroad crossings.

What Is Expected of Drivers

We take the stand that a motor coach operator must be more than a good operator. His constant driving should make him an expert in his profession and capable of grasping quickly bad situations and knowing instantly the best move in an emergency. He must be so thoroughly trained that he will anticipate and offset any move of the careless driver. We take the stand that the motor coach operator, on approaching dangerous places, must be prepared to stop if the "other fellow" is disregarding motor vehicle laws even when motor coach legally has right of way. The observance of the rule of stopping at all railroad cross-

ings has resulted in many favorable comments from patrons. It gives them a clear demonstration that Boston & Maine coaches are on the highway to provide a safe, pleasant and comfortable journey.

Of course some conditions surrounding the motor coach and truck service are quite different from those incident to rail operations. Rail traffic is under one control, with all employees under the same rules, subject to the same examinations and training. The highways are used by all classes of travel and traffic—from roller skates to Rolls Royces, and from scooter bikes to 10-ton trucks with trailers. Boston and Maine motor coach operators have met cars bearing registrations of every state in the union and most of the provinces of Canada during the summer months. Many of these motorists know very little about the motor vehicle laws of the New England States.

Motorists who seldom patronize highway common carriers are apt to be critical if, in their automobiles, they are unable to pass motor coaches or trucks promptly on the highway. It is important that operators watch conditions behind as well as ahead. In fact,

the ever increasing volume of highway traffic and the constant growth of special party work, which takes operators into unfamiliar territory, make it very important that there be hearty co-operation on the part of the operator if other users of the highway are to learn through experience that large vehicles can be safely and courteously operated on busy roads.

Operators are given talks from time to time at staff dinners on the importance of courtesy and careful driving. The fact that they are the only representatives of the company with whom many passengers come in contact, and that therefore their conduct and their driving must be such as to

win favor with the public, is impressed upon them.

Anything that will stimulate the interest of the operator in careful driving is well worth while. Bulletins showing the comparative records of different divisions are always helpful, although in using them route characteristics must not be overlooked. Some routes may cover congested highways, while others are through thinner traffic with less exposure to accidents.

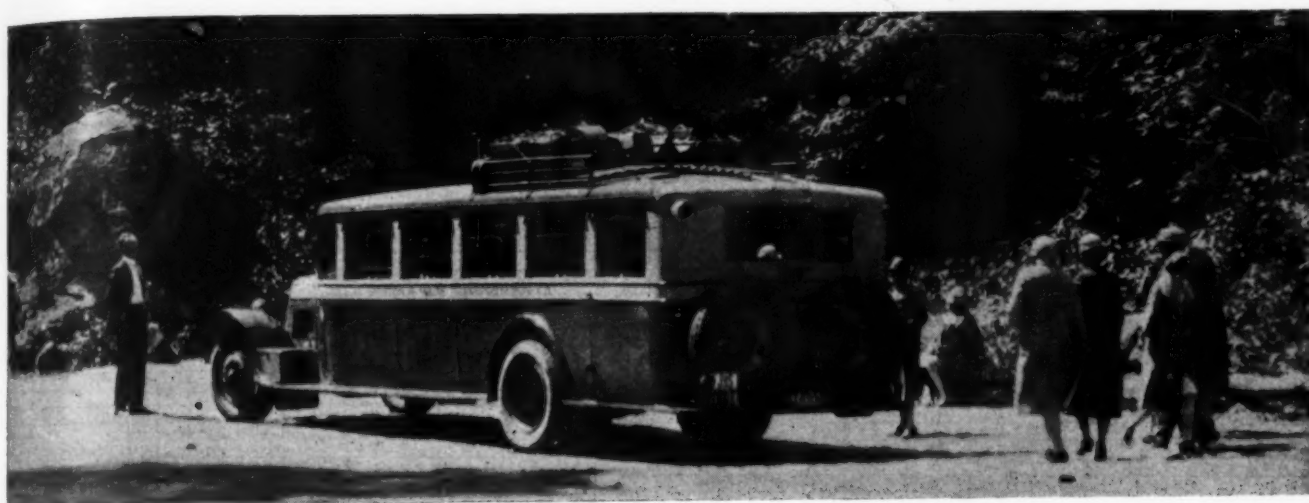
Bonus System for Safe Driving

In order that operators may keep a daily check as to mileage made without accidents, large charts are posted at the principal garages and divisional points which show the mileage made by each operator daily and monthly.

Operators take particular interest in watching the daily figures on these charts, as operators who have clear records for a six months period are paid a bonus varying in amount with mileage made:

From 1,000 to 4,999 miles	\$ 5
From 5,000 to 9,999 miles	\$10
From 10,000 to 14,999 miles	\$15





Extreme Care Is Taken to Protect Passengers on Special Tours

From 15,000 to 17,999 miles \$20
From 18,000 (and over) miles \$25

This system was started June 1, but was made retro-active to January 1, 1929, so that operators will not be obliged to wait six months before obtaining some benefit. Operators employed only in the summer, or men who drive occasionally, are paid a bonus in accordance with their mileage.

If an operator has an accident for which he is responsible, he is allowed to start accumulating mileage again for another six months period on the first day of the month following the date of accident. Accordingly, there is no disposition on the part of the operator to "slump," as there is practically no period when he is not building up credit under the bonus system. Operators entering the service on the first day of the month are allowed to start accumulating mileage on that date; otherwise, on the first day of the following month.

Thorough Investigation of All Accidents

Such a system requires a most careful investigation of accidents. It is the policy of the Boston & Maine Transportation Co. to have highway accidents investigated in the same thorough manner as those on the railroad. Of course, it is extremely important that all accidents be reported, regardless of nature, and that it be determined promptly whether or not it is an accident for which the operator is responsible. Occasion-

ally, there is a disagreement between supervisory men as to whether or not the operator is responsible for an accident. Such cases are discussed in detail at staff meetings and usually there is no difficulty in arriving at a clear cut decision.

Meritorious Service Cards

Cards certifying to meritorious service are given each year to operators with clear records. Accidents are charged against operators where there is any indication of carelessness or contributory negligence. If an operator hits the bumper of the car ahead of him in a line of traffic, he is charged with an accident whether or not any damage resulted. If cars are driven under low hanging branches which scrape the roof, this likewise is classified as an accident on personal records.

But we must recognize that some accidents are entirely beyond the control of the "man at the wheel." In states where considerable ice and snow is experienced during the winter, for instance, conditions arise which require most careful handling on the part of the operator.

Last winter on an icy road a woman driving a large automobile made a sudden application of the brakes and the car turned completely around directly in the path of an approaching motor coach. Fortunately at that point there was a gasoline station and the operator pulled the coach to the right off the highway. The automobile struck the rear left wheel of the coach,

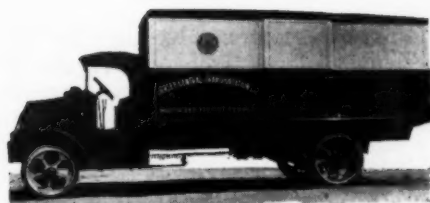
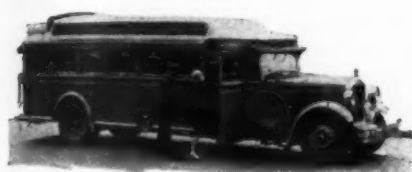


Carefully Selected, Well Trained Drivers Are Safety Insurance

A Constructive Program for

Motor Transport

Regulation



By R. W. Harbeson

Acting Head, Department of Economics, St. Lawrence University

IT IS the sole purpose of this article to call attention to what the writer believes are the fundamental principles upon which any constructive and permanently successful policy of motor transport regulation must be based. It is not pretended that the suggestions here made comprise a program sufficiently complete in detail to meet even the immediate problems of regulation presented to us. Our policy with regard to motor transport regulation must necessarily be in large measure empirical, just as our policy with regard to railway regulation has been. Motor transport regulation must develop *pari-passu* with the development of the motor transport industry, and with the experience gained from the application of particular policies and administrative methods to practical problems as they arise.

This does not mean, however, that we need enter into the era of motor transport regulation with nothing to guide us, nothing to point the way, nothing to enable us to avoid lurking pitfalls. While the motor transport industry is new and its particular problems even less known and understood than were the problems of the railway business when railway regulation began, we have benefited in our forty-odd years of railway regulation from the growth of knowledge concerning, and the thorough testing of, fundamental principles which are applicable to any form of common carrier transportation, whether it be by rail, highway, or otherwise. It is the sole purpose of this article to gather together and restate these principles and to point out their bearing on the problem in hand.

Develop All Forms of Transportation

As a point of departure we should lay down this general principle: that it should be our policy to develop and to maintain in full vigor all forms of transportation in so far as they can be demonstrated, to be economically justifiable, and to coordinate them as effectively as possible in the interest of an efficient and economical transportation system. There should be no presumption against motor transport or any other particular form of transportation. The public has a right to the cheapest, most adequate, and most convenient transportation service possible; and to meet this requirement, the claims of various

forms of transportation must be given a hearing.

Our problem is to find out whether, and to what extent, motor transport can justify itself as an addition to our transportation system on the grounds of contributing to economy, convenience, and adequacy of service. It is the writer's belief that the cheapest and most effective means of testing the validity of the claims made by motor transport advocates is the setting up of regulation based upon five fundamental principles derived from our past experience with common carrier regulation. To a brief consideration of these, we must now turn.

First of all, the regulation of motor coaches and trucks in interstate commerce should be put in the hands of a newly created division of the Interstate Commerce Commission, two or three men being added to the commission for that purpose. The commission itself has recommended that the regulation of motor coaches and trucks in interstate commerce be put in the hands of joint boards consisting of representatives of the regulatory boards of the states concerned. Probably the object of this recommendation was to enlist the sympathy and cooperation of the states in a program of regulation, and in view of this object the recommendation has some justification as a temporary expedient.

I. C. C. Must Regulate

Such an arrangement, however, is obviously crude and unscientific and could never become the basis of a successful regulatory policy. Sooner or later the regulation of motor transport in interstate commerce must be put in the hands of the Interstate Commerce Commission, in the interest of simplicity, uniformity, and effectiveness of administration, and in order properly to coordinate railway and motor transport service.

"Our course through the sea of motor transport regulation need not be a blind one. In fact, it is rather adequately charted for us by the principles here discussed. Failure to follow these principles, which would be tantamount to rejecting all of our costly though profitable past experience with common carrier regulation would ... be inexcusable. Such a result, let us hope, will be avoided."

Considerations of this kind prompted us to confer regulatory authority over interstate commerce upon a federal commission created for that purpose when the problem of regulating railways in interstate commerce first came up fifty-odd years ago. Similar considerations should now prompt us to meet in the same way the problems of regulating interstate commerce by this newer form of transportation. Moreover, in order properly to coordinate railway and

motor transport service and to benefit from the experience derived from our regulation of common carriers in the past, the same commission should have authority over all interstate commerce, whether it be by rail, motor, or otherwise.

The regulatory powers of such a commission should be comparable in their completeness to those now exercised over the railroads. It would be inexcusable if our costly experience with imperfect and incomplete powers of regulation over railroads in the past should be repeated in our policy, or lack of policy, with regard to motor transport regulation. One feature of any policy of motor transport regulation which should be given especial attention is the insertion of provisions adequate to secure maximum safety of service. Other provisions of similar importance will be discussed in the paragraphs which follow.

Uniform Accounting Standards

A second principle which is fundamental to any policy of regulation is that common carrier motor coach and truck companies operating in interstate commerce should be required to conform to accounting standards comparable to those imposed upon the railways. Again our experience with railway regulation should be our guide. Really effective railway regulation was found to be impossible until uniform and public accounts, based on the best accepted principles of accounting, were required of all carriers. The same will be found to be true in the field of motor transport regulation. There is absolutely no way of telling whether a motor coach or truck company is really making a profit or rendering service which is really cheaper than that offered by the railways unless and until these companies are required to keep their investment, depreciation, and other accounts in the manner prescribed in the case of the railways. Above all, we must not duplicate our present policy, or lack of policy, with regard to the accounting of our inland waterway ventures, accounting which the writer has elsewhere spoken of as a fiction, because of its failure to include interest on the investment and an adequate allowance for depreciation.

In the third place, common carrier motor vehicles should be required to pay in fees an amount equivalent to the extra cost of highway construction and maintenance occasioned by them.

Apportion Highway Costs

It should be apparent that we cannot ascertain whether motor vehicles, using highways provided at public expense, are actually rendering transportation service cheaper than that provided by the railways unless and until we assess upon them their proper share of our highway expenditures.

It is not contended, of course, that common carrier motor vehicles should pay the whole cost of highway construction and maintenance. The general public derives certain important benefits, directly and indirectly, from improved highways, and should be taxed for their construction and maintenance accordingly. What is contended, however, is that the extra costs of construction and maintenance occasioned by common carrier motor coaches and trucks should be borne by them. To separate these extra costs will indeed be a difficult matter, but with the notable development of statistical and cost account technique in recent years it should not prove to be an impossible task. Not until such a test is made can we say with any degree of certainty

that common carrier motor vehicles are under-taxed or over-taxed.

Certificates of Convenience and Necessity

Fourthly, every permit granted to a motor coach or truck company for operation in interstate commerce should be contingent upon the presentation of thorough and satisfactory evidence that the proposed service is required in the interest of public convenience and necessity. A certificate of public convenience and necessity is now required of all railways before they may build new lines, in order that unproductive extensions and wasteful duplication of facilities may be avoided. For precisely the same reasons, a similar certificate should be required of motor coach and truck lines. Lines which have been in actual and continuous operation over a considerable period of time should be granted such a certificate as a matter of course, the fact of their continued operation being sufficient evidence that the service they render is a necessary one. And existing transportation agencies should be given an opportunity to render any additional service which may be required before other transportation agencies are allowed to enter the field.

It is not that railways should be granted a monopoly of the transportation service in a particular territory, with the object that the investment in railway property should be protected against unwelcome competition. Nothing hurts a good cause as much as bad arguments. The public is entitled to the benefit of the cheapest form of transportation service, regardless of the existence of heavy investments in other forms of transportation. As a matter of fact, the cheapest form of transportation will prevail in the end, regardless of any efforts of ours to preserve others. But wasteful duplication of service or unnecessary extension of service is not in the public interest, for the public will have to pay for it, in one way or another, in the end. It is to avoid such a result that the requirement of a certificate of public convenience and necessity must be insisted upon. Here again we must be on our guard against the popular notion that everybody's money is the money of nobody in particular, and that therefore nobody in particular need concern himself with the task of seeing to it that it is not wasted.

Liability Insurance

Finally, every common carrier motor coach and truck company operating in interstate commerce should be required to carry sufficient liability insurance, or to file an indemnity bond of sufficient amount, to insure financial responsibility in meeting any and all accident or damage claims. The huge financial resources of the railroads insure the prompt meeting of all such claims as are presented to them. Patrons of motor coach and truck lines should have the same assurance of financial responsibility in case of accident that they now enjoy in the case of the railroads, and it is in this important particular that many coach and truck lines are exceedingly deficient at present.

Our course through the sea of motor transport regulation need not be a blind one. In fact, it is rather adequately charted for us by the principles here discussed. Failure to follow these principles, which would be tantamount to rejecting all of our costly though profitable past experience with common carrier regulation, would, in the opinion of the writer, be inexcusable. Such a result, let us hope, will be avoided.

Modern Conditions

Demand Co-ordinated Truck Service

By L. B. Young

Manager, Pacific Electric Motor Transport Company

FOR the distribution of less-car-load merchandise, purely railroad service has been unable to keep pace with the changing times, for two prime reasons: The railroads cannot go where all of the people are; and they cannot give the complete service that the people have been educated to expect.

But both situations can be met by co-ordinating motor trucks with rail service.

Before the advent of the motor truck, the factor that largely controlled the location of a community was the railroad. The railroad was the attraction, not merely because it was a railroad, but because it was the indispensable means of transporting those things upon which the community depended for its existence. Today the paved highway and the motor truck, co-ordinated with rail service, have opened up entirely new territory.

Population Growing Away from Railroads

The country's population is growing away from the railroads. Encouraged by the promotion of real estate projects, and served by net-works of high speed highways, the people more and more are following their inherent desire to spread out; and this has resulted in the springing up, in territory remote from direct rail service, of innumerable suburban towns and cities that would not have come into existence at all but for motor transportation. Collectively, these communities represent a substantial part of the consuming population, but without the motor trucks as an auxiliary, the railroads cannot serve them.

Old Standards Inadequate

Of course, even before motor transportation opened up new territory, there always were towns remote from direct railroad service; and, it might be argued, they were adequately served by the railroads in spite of their isolation. But in those days the lack of convenience in such communities was a normal state of affairs; the people were content to bring their supplies as close as possible by rail, and they themselves would assume the burden of the remaining haul by wagon. Today, linked by paved roads directly with large distributing centers, these communities, like the new towns that have grown up in the wake of the highways, demand a complete transportation service that the railroads, better than any other agency, can provide by co-ordinating their rail service with motor truck delivery.

But serving the off-rail community is not the only problem. Whether the town served is removed from, or directly on the railroad, the service must be fast and it must be complete. We are past the age when the receipt of a bill of goods was an event. A few years ago the "drummer" called on the trade twice a year; and

the merchant was concerned with transportation problems only when he received his spring and fall stocks. Today, with salesmen covering suburban territory daily, the telephone ready at hand, and intense competition in every field, it is no unusual thing for the retailer to order a stock of the same article from the same jobber every day during a season, and expect the new supply on his shelves every morning before eight o'clock.

Small Shipments in Majority

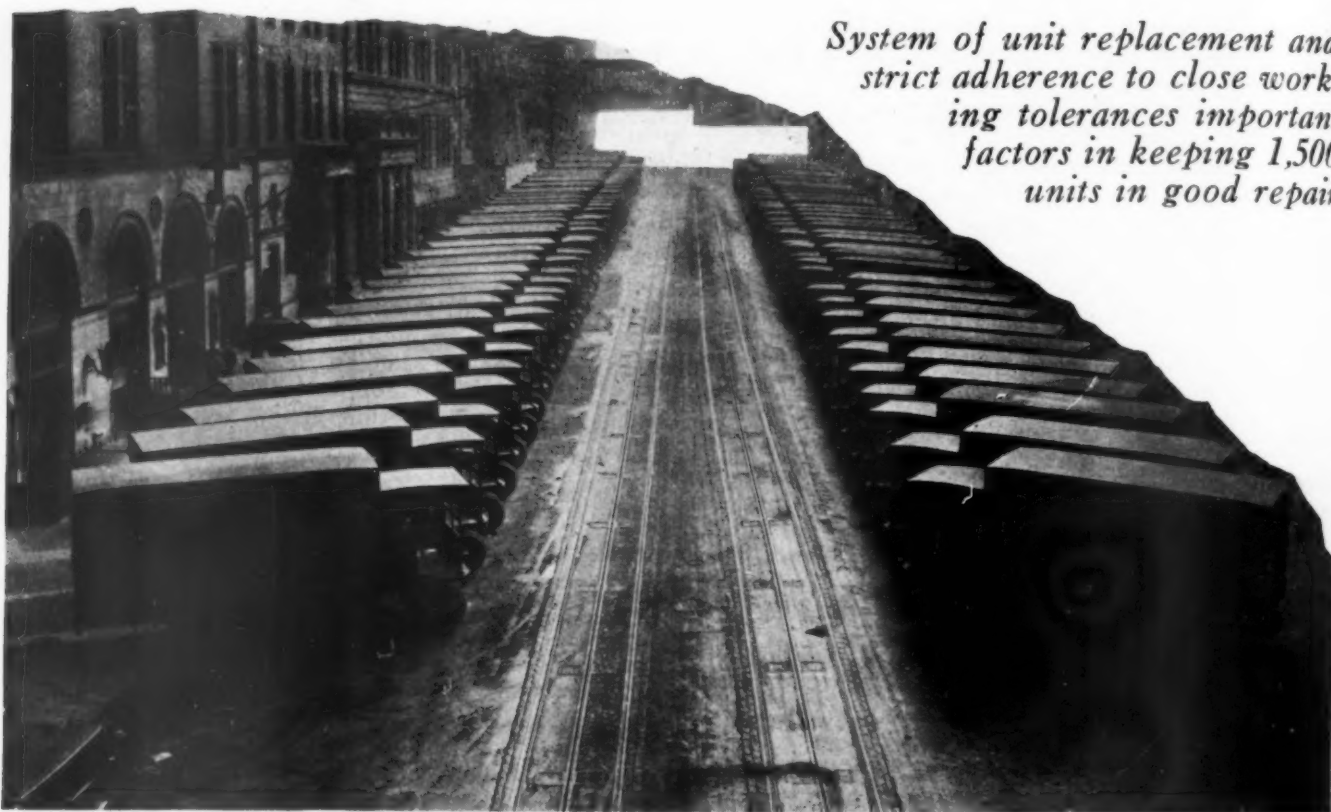
It is the experience of one large transportation company serving fifty suburban towns and cities within a hundred mile circle, that 68 per cent of all shipments handled are "minimums" weighing less than one hundred pounds. With hand to mouth buying on this narrow margin, what at one time was a substantial l. c. l. freight business has changed almost into a "Parcel Delivery"; for which purely railroad freight service was not designed. It has become a class of business that requires fast and complete service up to the merchant's store-door, at one charge for the entire service.

Railroads Have Advantage

But with the auxiliary use of motor trucks, the railroads still are ideally situated to handle this merchandise in spite of its changing character. To points that can be reached over night by rail service, the railroads, by co-ordinating truck delivery, in most cases can give service superior to that offered by purely truck carrier, for these reasons: Generally first morning delivery is satisfactory if it is early enough, and, with over night rail service, delivery between seven and eight A. M. is entirely practicable. To accomplish this, of course, delivery truck service, either by owned trucks or by contract with local draymen, must be maintained for each town; and that is wherein lies the railroad's advantage over the truck carrier. The railroad generally has a station building at each point served, at which the night train can set out its merchandise, making it available for early morning delivery. The truck carrier, in most cases, has no station or agent, but delivers from his line-haul truck directly to his patron's door; and, consequently, in order to serve his nearest point not earlier than seven A. M., he must be content to reach his more distant points disastrously late for successful competition with the railroad's earlier delivery.

A co-ordinated rail-truck operation presents many intricate problems; and it appears that the most satisfactory way for a railroad to engage in it is through a subsidiary company to conduct the trucking service. The people have been educated up to a new factor in transportation; and they expect services that are not properly a part of the major business of railroad operation.

How the Express Agency Maintains Its Trucks in New York



System of unit replacement and strict adherence to close working tolerances important factors in keeping 1,500 units in good repair

One Hundred Five-Ton Trucks Lined Up Before the Forty-Second Street Garage in New York

THE Railway Express Agency, Inc., until recently, the American Railway Express Company, Inc., has divided into divisions the territory in the United States in which it operates. In the principal city in each division is located a motor-vehicle repair shop in which all major overhaul and general repair work is done. Repair shops are located in Philadelphia, New York, Boston, Cleveland, Buffalo, Detroit, Chicago and San Francisco. The activities of the main repair shops are governed by a general superintendent in charge of shop operations who is located at New York City. Throughout the country are located garages in which the company's trucks are housed and receive running repairs.

Each back shop overhauls all of the trucks operating in a definite territory. For example, the New York back shop, located near the Grand Central Terminal, is held responsible for the 1,500 street trucks and the 200 depot industrial trucks which operate in the territory comprising the area between Albany, N. Y., and New York City, Long Island and northern New Jersey. A total of 1,028 gasoline and electric street trucks and 150 electric and gasoline depot trucks are operated in greater New York and the New York shop is the company's largest repair shop. A total of eight garages are located in greater New York, six of which have a full force of mechanics working 24 hours and two of which have a force of mechanics working during only one eight-

hour period. A force of 109 men are employed in the repair shop.

The operation of the service garages is a story in itself and will not be dealt with in detail in this article. Briefly, however, as each truck comes in from its tour of duty, the operator hands in a work report. A mechanical inspector goes over each unit, giving it a thorough visual inspection during which he examines the spring shackles and bolts, the springs, the frames for fractures and loose rivets, listens to the engine for unusual knocks and pays particular attention to the steering gear and brakes. The company takes the position that when the motor fails, the truck stops, but when the steering gear or brakes fail, it is difficult to bring the truck to a stop. Therefore, these two important parts are always carefully examined each day. The inspector hands in his report, together with the operator's report, to the mechanical foreman of the garage who sees that all of the repairs noted are made, except those that require considerable time and which do not interfere with the safe operation of the truck. Any such deferred maintenance is reported at once to the chief mechanical officer for his disposition. Deferred maintenance is not allowed to accumulate and the mechanical officer usually orders the truck in for a general repair. The result is that the road failures are unusually low.

A few of the gasoline tractors used to haul trailers

work 24 hours a day. The tractors are brought in the garage once during this period for inspection and minor repairs. During one 24-hour period out of every seven days, the tractors are kept in the garage for a thorough inspection and running repairs.

Each unit receives general lubrication once every seven days and the transmission and differential are checked once each month. The grease is not removed, but more is added if needed. For those trucks which operate only eight hours a day, the crankcase oil is changed every two months and for those working 16 hours a day, it is changed every month.

The company insists that its equipment be kept clean because it is always in the public eye. The body, chassis and engine of each unit are thoroughly cleaned on the average of every seven days.

Because of the conditions under which the trucks are operated, no attempt is made to repair them on a mileage basis. The shopping is determined by the conditions disclosed by the daily inspections and by the performance of the trucks. Each unit is brought in once every twelve months for a general repair and each elec-



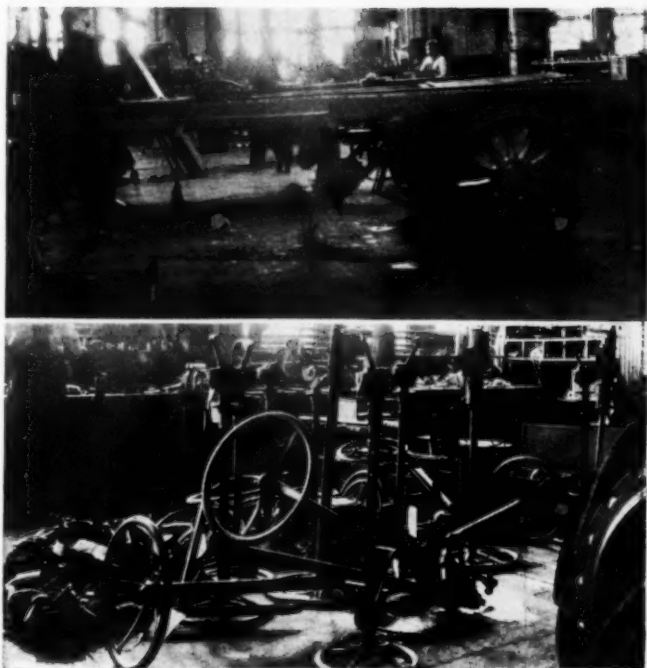
Special Body Designed for the Railway Express Agency, Inc., by H. C. McFarlane Company, Chicago

tric unit, once every three years and each gasoline unit once every two years for a major overhaul.

Unit Replacements

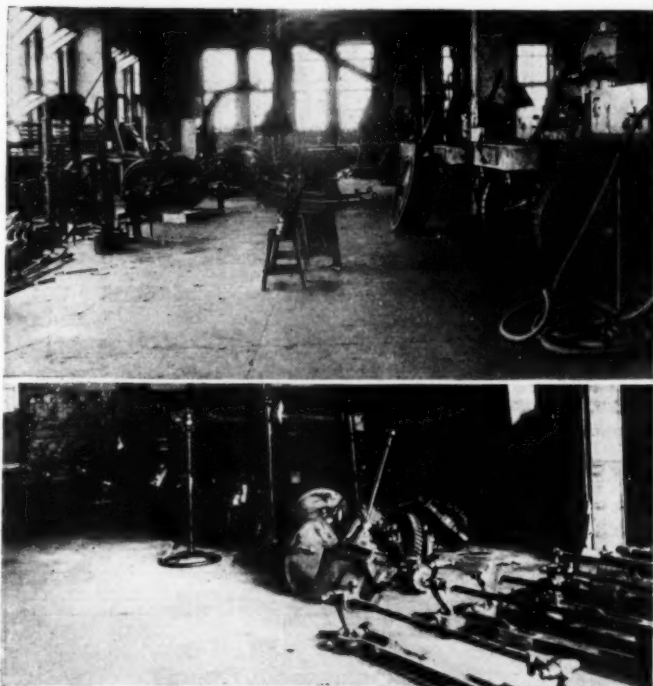
Some years ago, when a transmission, a differential, a steering column assembly, or other sub-assembly failed on a truck operating in an outlying district at a considerable distance from the general repair shop, the truck was sometimes tied up for weeks before the parts could be assembled to make the necessary repairs. This led to the practice of keeping on hand at each garage an extensive supply of spare parts in order to keep the units in service, and an increasing investment was tied up in idle stock. It was finally decided to develop a system of unit replacements and as far as possible to assign trucks from a single manufacturer to each district.

Under this system, complete sub-assemblies, such as the front axles, rear axles with the wheels and brake drums, the transmission, the steering-gear assembly, and the short drive shaft on which the emergency brake



Top: Trucks Undergoing a Complete Overhaul—Bottom: Overhauling Steering Column Units

is mounted for each make of truck operated in the district, are repaired at the main shop and put in stock. Under this system, if, for example, the steering column assembly fails on a truck at Albany, the New York general repair shop ships a repaired assembly at once, and the unit is back in service within 24 hours after the failure. A direct result of this system of unit replacements is that the stock of spare parts has been reduced to one seventh of the amount formerly required. Another direct result is that each unit is maintained in good mechanical condition between overhaul periods; maintenance need not be deferred at the outlying garages awaiting repaired parts.



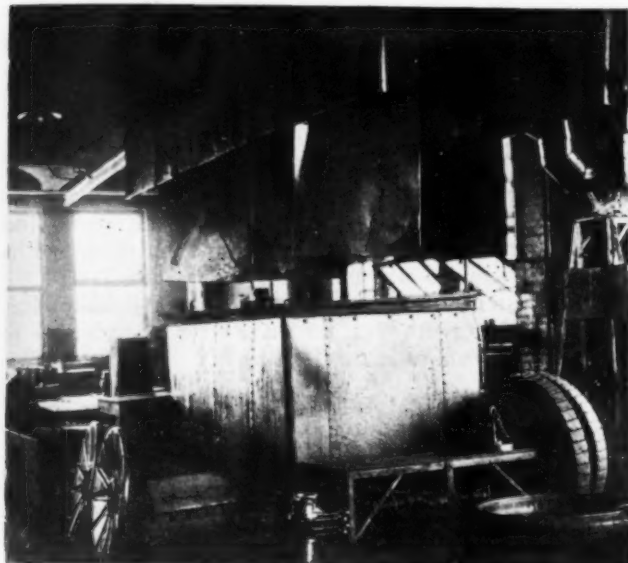
Top: Repairing Unit Replacement Parts—Bottom: Repairing Parts Ready for Service

credited in stores, and the next, the date and the number of the truck on which it was next installed for further service. If part No. 580 should be completely destroyed its history card would be closed with the notation that the part had been scrapped, and the new assembly replacing it would take a new number. The closed cards are filed for future reference.

After the shop superintendent has examined the history card and Form 3227, he issues Form 143 in triplicate, on which is listed the work to be done to the unit and the date it is scheduled out of the shop. The original goes to the shop foreman, the second copy to the material billing clerk, and the third to the agent to whom the truck is assigned so that he will know when he may expect to receive it for service.

Each truck is repaired under a job number, against which all labor and material charges are made for accounting purposes. The body is first removed and sent to the body shop. The chassis is thoroughly washed, after which it is sent to the proper department.

The building in which the repair shop is located has eleven floors, five of which are assigned to chassis re-



Room in Which Parts are Cleaned and Radiators Repaired

pairs. The remaining floors are used for body and paint shops, storage of new trucks and repaired replacement parts and for service or running repairs and housing purposes. On the eleventh or top floor are located the machine shops which are fully equipped with turret and engine lathes, drilling machines, a special machine for turning brake drums; in fact, all the machine tools necessary for the manufacture of parts.

There are no machines in these shops for grinding cylinders or crankshafts. All engines are sent to the manufacturer for overhauling and are returned as rebuilt engines. This system makes it necessary to keep a number of rebuilt engines in stock for each make of truck. When an engine replacement has to be made, it is but a matter of three or four hours to make the change. Rebuilt engines are also shipped to the outlying garages for installation when needed. Only minor repairs are made to the carburetors and the magnetos. These parts are also sent to the manufacturers for overhaul repairs.

Springs are also sent outside for repairs. After springs have been repaired twice, they are scrapped. Experience has demonstrated that after being heat-

AMERICAN RAILWAY EXPRESS COMPANY																																																																																																																														
MOTOR VEHICLE INSPECTION REPORT																																																																																																																														
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				0-Item Does Not Appear on This Model																																																																																																																										
Place "K" after specific item referred to. Place dash "-" after Key Number when previous recommendations were not followed.																																																																																																																														
1. Cab, Open, Closed	2. Windshield	3. Body, Paint & Repairs	4. Hood, Hinges, Latches	5. Starting Crank, Switch	6. Comp. 1, 2, 3, 4	7. Magneto Couplings	8. Pump Couplings	9. Water Pump Packing	10. Magneto	11. Distributor	12. Breaker Points	13. Ignition Timing	14. Spark Control	15. Rocker Arm Bolts	16. Push Rods or Yaps	17. Valves, Intake, L.I.A.	18. Valves, Exhaust, L.I.A.	19. Wiping	20. New Conn. Upper, Lower	21. Radiator	22. Radiator Support	23. Fan, Gears, Bushings, Belt	24. Cylinder Head Studs, Gasket	25. Manifold Gaskets, Intake, Exhaust, Water	26. Oil Level Gauge	27. Fty. Fenders, R. Left	28. Head Lights, R. Left	29. Fty. Wht. Brags, Right, Left, Alignment	30. Fty. Axle, Bolts, Pin	31. The Body, Gears, Pin	32. Sprags, Fty. Right, Left	33. Shackles, Sprags, Bolts	34. "V" Bolts, Fty. Axle, Right, Left	35. Sprags, Center Bolts, R. Left, Fty. Pin	36. Guards, Floor, Running	37. Seat Cushion	38. Ignition Switch	39. Ignition Starter	40. Cyl	41. Choke Assembly	42. Starting Motor Switch	43. Locking Switch	44. Lighting Circuit	45. Ammeter	46. Generator	47. Circuit Breaker	48. Pressure Gauge	49. Horn, Wire, Button	50. Throttle Control	51. Governor Sol.	52. Camshaft	53. Timing Gears	54. Main Brg. F. C. R.	55. Conn. Brg. 1, 2, 3, 4	56. Wrist Pins, 1, 2, 3, 4	57. Wrist Pin Brg. 1, 2, 3, 4	58. Pistons, 1, 2, 3, 4	59. Piston Rings	60. Spark Plugs, 1, 2, 3, 4	61. Cyl. Bk. Sves	62. Camshaft	63. Camshaft Brg. F. C. R.	64. Motor Bolts, F. R.	65. Crankcase Bolts, Gasket	66. Oil Pump Ekn.	67. Motor Oil	68. Carburetor	69. Clutch Brg. Brake	70. Brakes, Foot, Hand	71. Master	72. Surge Gear Bolts, Arm	73. Fuel Tank, Line	74. Battery Terminals, Water Level	75. Transmission, Bolts	76. Transmission Brgs, Gears, Yokes, F. R.	77. Frame Main Sub	78. Muffler	79. Prop. Shaft Splines	80. Universal Joints	81. Differential Pin Bearings, Yoke	82. Differential Gears	83. Body Mounting "U" Bolts, Champs	84. Brake Equalizers	85. Rear Axle	86. "U" Bolts, Rear Axle, Right, Left	87. Sprags, Rear R. Left	88. Auxiliary Springs Right, Left	89. Shackles, Sprags, Bolts, R. Rear, Left Rear	90. Spring Center Bolts, R. Rear, Left Rear	91. Rear Wheel Bearings, Right, Left	92. Internal Gears	93. Jackshafts, Pinions, Right, Left	94. Jackshaft Bearings, Right, Left	95. Rear Fenders, Right, Left	96. Grease Caps or Fittings	97. Tail Light	98. Condition Rims	99. Condition Tires	100. Midge Recorder	101. Miles Traveled	102. Batteries	103. Traps	104. Straps	105. Turnbuckles	106. Leads	107. Handles	108. Wiring	109. Motor	110. Axle	111. Pinion	112. Pliers	113. Motor Leads	114. Resistance	115. Gids	116. Controller	117. Fuel	118. Drive Segment	119. Motor	120. Switch	121. Chng. Receipts	122. Lights	123. Champs	124. Front Spragbolts	125. Rear Spragbolts, L. or R.	INSPTS TIME	

The Mechanical Inspector Fills in This Form When a Truck Comes in for Overhaul Repairs

treated twice, the steel loses its original physical characteristics, and failures become frequent.

Overhauling by Manufacturers

When an engine is sent to the manufacturer for overhaul, form No. 21 is filled out. This gives a complete history of the engine and how it functions. In order to fill out this form, two very accurate recording instruments are used. One is a stethoscope which is used to determine the cause of all unusual engine noises and to locate definitely the part causing the trouble. The second instrument is called an automatic motor-control device which is used to determine the timing of the valves, cylinder compression, amount of valve opening, position of the pistons on ignition before and after the pistons reach the top dead center, with the spark advanced and retarded, etc. This form when filled out

Card Record—Motor Vehicles—American Railway Express Company (Inc.)			
GAS ELECTRIC	TOTAL WGT. LESS LOAD	CAP.	MODEL MAKE
LOCATION		IN SERVICE	SERIAL NO. BODY
Chassis No.		Chassis Wgt	Body Style
Motor No.		Exhaust Lgth.	Make
" Make		" Width	" Inside Lgth.
" H. P.		" Lgth. Seat to Rear	" Outside Lgth.
" Base		Frame Width	" Width
" Stroke		Wheel Base	" Inside "
Ignition Sys.		Height with body	" Wght
Carburetor		" without body	F. L. Door
Governor		Size Front Tire	R. L. Door
Magneto		" Rgr "	Tail Board
Drive		Type of Tire, front	Bottom Gate
Size of Chain		" " rear	Driver's Cab
Diffus. Ratio		Type of Wheel	Spindle
Battery Type			Window Light
Battery No.			Cup
Cyl.		Plate	

The Front of a Truck History Card

serves as a guide to the manufacturer in overhauling the engine.

The Location of Departments

The chassis of four electric trucks are undergoing repairs continually on the eleventh floor of the shop. The chassis of six gasoline two-ton trucks and of three electrical industrial trucks are repaired on the tenth floor. On the ninth floor is located the sheet-metal department, the parts-cleaning shop, the radiator repair section, together with a gang of men overhauling six electric street trucks. The eighth floor is set aside for the storage of new trucks and repaired spare units. A total of 17 gasoline trucks are always undergoing repairs on the seventh floor. The sixth floor is used as a part of the paint shop for the assembly of the body and accessories and testing the truck before it is sent out for a road test. The entire plant accommodates 33 street trucks and three industrial trucks in process of repairs. On each floor where chassis repairs are made, spare parts are also repaired.

Sequence of Operations

Usually when a truck is sent in for overhaul repairs, all of the parts are removed from the chassis, which is inspected for fractures and loose rivets. The removed parts are cleaned, repaired and reassembled on the chassis. The completed chassis is then sent to the paint shop where it is again washed preparatory to painting. It receives two coats of paint and the body is then put in place. The brakes are carefully tested before the truck leaves the shop. A James brake-inspection decelerometer, approved by the United States Bureau of Standards, is used for this work. The truck is then driven 20 miles through the streets of New York, after which final adjustments are made.

When a truck comes in for general repairs, which

is once every 12 months, only those parts are repaired that need it. Thus, the rear and front axle assemblies may not be removed from the truck. The engine may receive a new set of rings, the bearings be taken up and the valves ground in. All high-tension wiring is changed once a year. The body may receive only minor repairs and a coat of varnish.

General Policies in the Maintenance Department

The company has adopted a strict policy of keeping each part up to manufacturers' standards. Blue prints have been prepared for each part of each make of truck, on which are marked plus and minus micrometer tolerances. These prints are sent from the general office to all garages in the country.

The company formerly experienced considerable trouble with requisitions for parts received from outlying garages on which an inadequate description of the part was furnished. This often resulted in shipping either the wrong part or the wrong size. To overcome this trouble, the company has had prepared large blue prints on which are drawn the detailed parts for each assembly. Each part is numbered and at the bottom of the print is a key covering the numbers. Material is now ordered by the part numbers. This system has eliminated all confusion and possibilities of errors.

The mechanical department in New York also issues bulletins which cover any changes in standard equipment which must be adhered to all over the country. These bulletins are made up in blue-print form and contain drawings showing the parts as they are and other drawings showing the changes to be made. Brief descriptions of how the work should be done and the material required are listed on the prints.

The system of standardization has not only eliminated costly errors but has effected a considerable reduction in maintenance expense.

* * *



A.C.F. Parlor Observation Type Coach Operated by B. & M. Between Boston and Portland

New Equipment

White Model 65 Six-Cylinder Motor Coach

THE White Company, Cleveland, Ohio, has placed on the market its Model 65 six-cylinder motor-coach chassis which has a seating capacity of 18 to 21 passengers, including four drop seats. The wheel base is 182 in.

It is powered with a rugged six-cylinder overhead-valve engine with seven-bearing crankshafts, which has a bore of 4 in. and a stroke of $5\frac{1}{4}$ in., giving 396 cu. in. displacement and a N.A.C.C. horsepower rating of 38.4. The combustion chambers are machined to insure equal compression in each cylinder which, together with aluminum alloy pistons of the constant-clearance type, give a smooth running engine. A large diameter crankshaft running in steel-back bearings with a heavy ribbed aluminum crankcase provides maximum rigidity. The crankshaft is dynamically and statically balanced, and each connecting rod, with its piston, is also carefully balanced with a weight tolerance of only $\frac{1}{4}$ ounce between any of the six assemblies in the engine.

The large water jackets of the nickel-chrome-iron cylinder block, which are carried down to the crankcase, also assist in cooling the crank case, and the ends of the cylinder which project into the crankcase are further cooled by lubricating oil.

The cylinder head, which is detachable, contains the valves and rocker arms as an assembly, thus providing for unit replacement and for the minimum time out of service for overhaul of valves, etc. A thermostat for the control of cooling water is mounted in the water outlet in the cylinder head.

The camshaft, which runs in seven bronze bushings, is of special design to provide a large valve clearance, but with quiet operation, thereby preventing any danger of the valves riding under continuous high-speed operation.

The valves are actuated by rocker arms through push-rods and mushroom type followers. The rocker arms bear on inverted cups in guides which take all side thrust

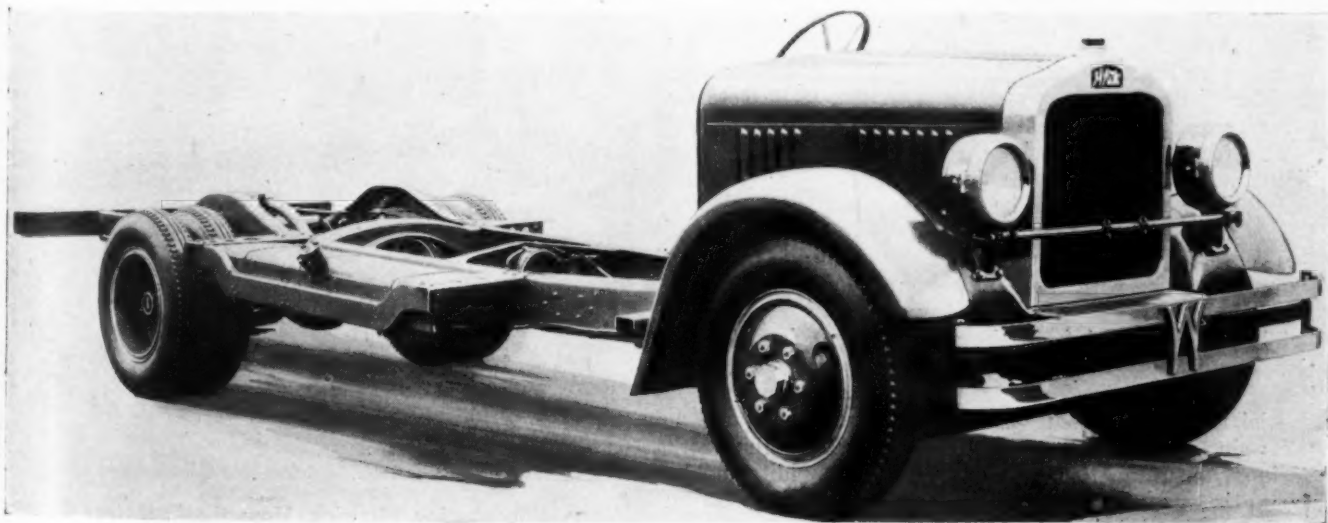
off of the valves and prevent excessive oil from reaching the valve stems. The valve mechanism is entirely enclosed and positively lubricated from the main oiling system.

The lubrication system has been worked out with drilled passages leading oil under pressure to the main, connecting-rod, camshaft, piston-pin, accessory-drive and chain-idler bearings, and with metered lubrication to all actuating parts of the valve mechanism. A special metering groove in the connecting rod provides for piston and cylinder lubrication, and a constant stream of oil is directed onto the timing chain. The lubrication system has a main distributing point in the form of an oil manifold which is a cast-in tube running the full length of the crankcase. The return system is the special White reverse-flow system which furnishes clean oil under all conditions for circulation. A special adjustable orifice, together with a fixed spring-loaded blow-off valve, maintains the pressure in the system at the required amount. The oil pump of large capacity is of the gear type mounted in the crankcase sump and driven directly from the camshaft. The oil capacity is five gallons.

A silent front-end timing chain with an automatic adjustment is used for driving the camshaft and accessory shaft. The accessory shaft, which is mounted in two widely spaced bearings, drives the ignition unit directly by skew gearing, and an extension drives the generator and water pump, both of which are cradle-mounted and positively aligned on the crankcase. The water pump of the centrifugal type has only one stuffing box. The lubrication of the pump bearings is obtained by water from the high-pressure side of the pump. The water inlet is at the rear end of the cylinder block.

The aluminum inlet manifold is of the special down-draft type and, with the heated carburetor riser, provides for efficient distribution and vaporization of the mixture. A Zenith plain-tube, compound-jet carburetor is furnished with an air cleaner of the oil-wetted type. The carburetor is fed by a fuel pump.

The exhaust manifold is largely cast in the cylinder head on the left side, and the exhaust gases are led



Chassis of the White Model 65 Motor Coach



One of the Model 65 Coaches Delivered to the Utah Parks Company, a Subsidiary of the Union Pacific System

through the center of the cylinder head, through the carburetor riser and into a single exhaust pipe.

Crankshaft ventilation is provided by a breather pipe which connects the crankcase with the carburetor air intake, preventing the escape of crankcase fumes by a recirculation through the engine.

The battery ignition is of the two-spark, electrically synchronized system, with two sets of spark plugs. A governor of the centrifugal type, driven directly from the engine, is furnished and is set and sealed at 2,400 r.p.m.

The clutch is of the single-plate type running in oil, with a ball-bearing throwout which, with the throwout shafts, is automatically lubricated from the engine-oiling system. The clutch, which is completely enclosed, is easily adjustable from the outside.

The transmission, which is a unit with the engine, is of the selective four-speed type, with wide gears on shafts mounted in large ball bearings.

The front axle is of the reversed Elliot type with the wheels mounted on taper roller bearings. The axle center is specially strengthened to carry the resultant braking forces from the front-wheel brakes. The king pins are inclined for semi-center point steering, and the use of combination steel and bronze thrust washers provides firm and easy steering, with absence of kickback.

The rear axle, which is of the single-reduction semi-floating type, has a one-piece cast housing with a carrier-mounted differential assembly, and a separate housing for the pinion which, together with the use of taper roller bearings, permits all adjustments for wear.

The wheel spindles, which are of exceptionally large diameter, are supported on double-taper roller bearings mounted back to back. The overhang of the wheel centers is reduced to a minimum.

The service brakes are of the four-wheel Lockheed hydraulic type, with a Westinghouse vacuum-operated Servo built integral with the hydraulic master cylinder.

The frame, which is of the pressed-steel channel section, double kick-up type, is of rigid construction, with heavy tubular and channel-section cross members. A special tubular member is placed between the frame at the point of attachment of the front end of the front springs, insuring the maximum frame rigidity. The frame is specially heat-treated and has a cross-section of $9\frac{1}{4}$ in. by $3\frac{7}{16}$ in. by $7\frac{7}{32}$ in.

The emergency brake is an external contracting band

mounted on the drive shaft, with a brake drum of special gun iron.

The gasoline tank, which has a capacity of 40 gallons, is mounted in a special cradle on the right side of the chassis. The cradle and the tank are easily removable with the body in position. The gasoline feed to the carburetors is by a mechanical fuel pump mounted on the engine and driven by an eccentric on the camshaft.

The steering gear, which is of heavy construction, is of the nut and screw type, with an exceptionally large wearing surface and mounted with adjustable ball thrust bearings.

The front and rear springs are semi-elliptic. The rear spring is of the two-stage type to take care of the light and loaded conditions. The front springs are shackled at the front and Lovejoy hydraulic shock absorbers are mounted both front and rear.

The radiator is of cast aluminum with a removable cellular core, and the fan, which is mounted on taper roller bearings, is driven by a vee belt.

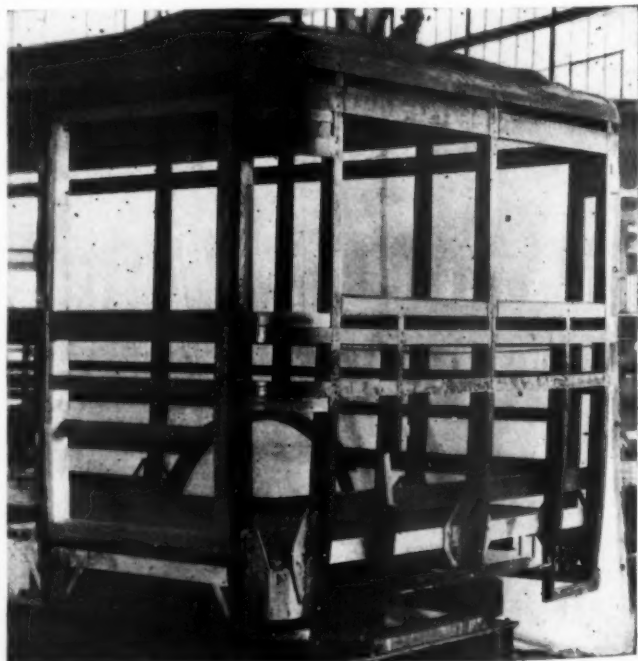
The two-section propeller shaft is used, with oil-lubricated universal joints and with a center propeller-shaft bearing of the self-aligning type.

The two-unit starting and lighting system is used, the generator being of the voltage-regulated type, with a capacity of 25 amperes.

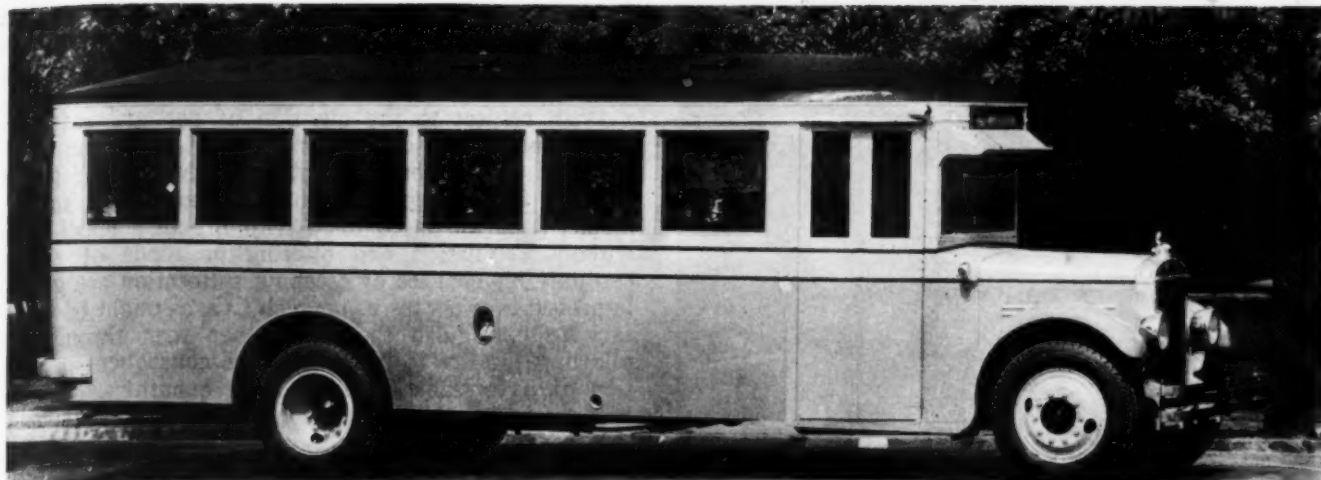
Disc wheels with 36-in. by 8.25-in. low-pressure tires, single in front and dual on the rear, are standard equipment.

Mack Builds Line of City Motor Coach Bodies

MACK Trucks, Inc., 252 West Sixty-Fourth street, New York, is now actively engaged in the manufacture of a new line of city type motor coach bodies for use with either four- or six-cylinder chassis. The new bodies are modern in appear-



Frame Construction Showing How the Posts are Secured by Through Bolts to Malleable-Iron Gussets Hot-Riveted to the Sills



Mack C1 Motor Coach

ance because of a harmonious streamline effect, which is further accented by the lower belt line extending the full length of the chassis in a straight and unbroken line.

Among the other characteristics which give the bodies a distinctive appearance is the integral skirt of unit-parts construction, the units of which are replaceable from stock at all Mack factory branches. The rub-rail has been eliminated, and the doors are equipped with concealed hinges and smooth panels. An improved destination sign and new type ventilators are also features of the bodies. The spare tires are carried beneath the chassis, instead of at the rear, allowing for greater body overhang without increasing over-all overhang. The cowl has been considerably shortened, and the steering is placed outside the frame and well forward, so that the driver is seated in the left forecorner of the body as compactly as is practicable for proper driver freedom, which provides more room for standees.

The interior of the bodies have smooth wide ceilings, large aisle space, clear and unobstructed vision, leather covered seats, Flexolith flooring, close-fitting advertising card racks, and a convenient passenger signal system. They are built to accommodate 29 to 37 passengers, and the width of 96 in. insures riding comfort for standees.

All major strength members, such as the posts, the pillars and the frame, are made of selected thoroughly dried white ash. The body is built up on steel structural angle sills and the posts are secured by through bolts to malleable iron gussets, hot riveted to the sills. All joints are mortised and tenoned, screwed, glued and re-inforced by pressed-steel angle plates and braces. All posts and exterior and interior exposed wood are covered with aluminum.

No. 14 gage sheet aluminum, shaped to the sweeps and curves of the body, is used. Vertical individual panels facilitate body repairs. The panels are screwed and nailed to the body framing. The joints are covered with aluminum molding. The lower belt panel, 6 in. wide, is continuous through the length of the body. The letterboard is 3 in. wide.

The inside panels are made of No. 22 sheet steel, securely screwed to the frame rolled to prevent drumming. This construction provides dead air space for heat insulation.

The floor is made of white ash, 1¼ in. thick, tongued and grooved with ¾-in. Flexolith composition floor-

ing laid over felt and re-inforced with wire mesh. The trap doors are pressed steel, covered with Flexolith and bound on the edges with aluminum molding. Traps are furnished for openings over the transmission, the emergency brake and the rear axle.

Haskelite roofing, formed to the roof curves, placed over reinforced ash bows, is covered with automobile top material. The ceiling is sheathed with No. 16 gage aluminum, giving an unbroken and easily cleaned surface.

The front entrance door is of the two-leaf collapsible type, folding outward and forward on 1-in. tubing at the front pillar. Spherical bearings are used at the top and bottom, with adjustment for wear. The door is operated by a crank mounted on the windshield bar with adjustable connecting rods. A toggle locks the door in the closed position. An emergency door is placed on the left rear and is operated by a safety latch controlling a three-way lock.

Carbon Dioxide Gas Fire Extinguisher

A RECENTLY developed fire extinguisher employing carbon dioxide gas as the extinguishing medium operates under a new principle by displacing the oxygen necessary to support combustion with carbonic acid gas. This gas is 50 per cent heavier than air and lies in an inert condition over the surface, creeping into the smallest crevice.

This type of portable extinguisher was developed by the Fyre-Freez Corporation, 129 West Ninth street, New York. The extinguisher is in the form of a steel cylinder fitted with a short piece of metallic flexible hose having a funnel-shaped nozzle. The cylinders are filled with liquefied carbon dioxide gas under pressure of about 800 lb. per sq. in. The extinguisher is operated by turning a hand valve which releases the gas into the hose and through the nozzle. The releasing of the gas to the atmosphere solidifies it to dry carbonic snow which is extremely cold (110 deg. F. below zero). The sublimation of the snow back to gas absorbs the heat in great quantities and the gas displaces the oxygen necessary to support combustion.

Commercially, carbon dioxide is obtained through the



Large Type of Carbon Dioxide Extinguisher Suitable for a Garage

combustion of coke. The liberated gases are collected, subjected to a process to remove impurities and moisture, compressed to a pressure of from 700 to 1,000 lb. per sq. in., and charged into storage cylinders of seamless steel for the general trade. These cylinders, as well as those of the extinguishing type, are designated by the Interstate Commerce Commission as I.C.C. 3 and are equipped with a safety disc device which is ruptured should the stored gas attain a pressure of 2,400 lb. or more. The margin of safety is about 800 lb.

The use of carbon dioxide is a psychological help to the fire fighter. Instead of a thin stream with which he must reach the seat of the fire, a business that requires coolness and concentration, carbon dioxide emerges in a broad blanket. In the unsteady hand this broad blanket will reach the vital spot; it will travel through the most intricate wiring; it will pass through a screen. Again, to aim the nozzle or cone is about as simple as pointing a finger. Another helpful item is in the partial



Using a Hand Portable Carbon Dioxide Fire Extinguisher to Smother a Gasoline Fire in a Motor Truck

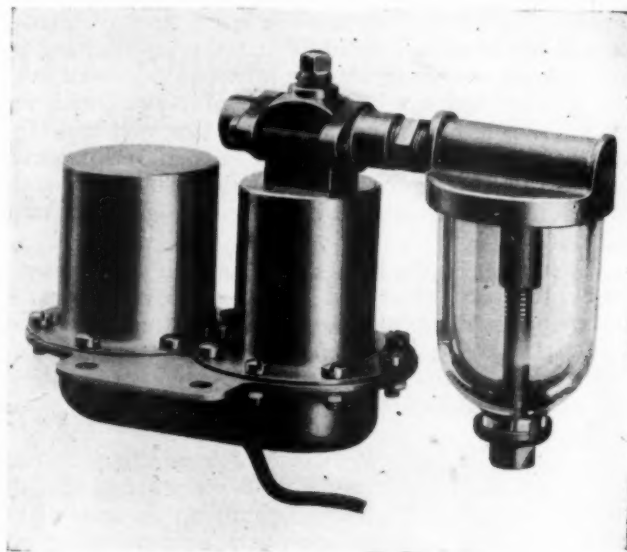
insulation of the operator against the fire's heat, because of the coldness of the blanketing gas. Important also is the fact that the smoke from the fire is rapidly diminished.

With respect to the question of personal safety in connection with using carbon dioxide, it may be safely assumed there is no life hazard involved in the use of portable fire extinguishers in open rooms. If, for example, a person is confined with fire in a small room without ventilation and offering no mode of egress, certainly his chances of escaping suffocation are greatly improved through his using such CO_2 as might be necessary to extinguish the fire, rather than through his allowing the fire to burn, with the consequent production of irrespirable gases in large quantities. Human life can endure in an atmosphere that will not support the combustion of a match.

The carbon dioxide gas is particularly suitable for extinguishing electrical and gasoline fires.

An Electric Gasoline Pump

THE illustration shows an electrically-driven gasoline pump for motor coach engines, a recent development of the Consolidated Instrument Company of America, Inc., New York. The unit is designed to pump any required amount of gasoline up to 20 gal.



An Electrically-Driven Fuel Pump with a Rated Capacity Up to 20 Gal. an Hour

an hour and to maintain a uniform flow under all operating conditions.

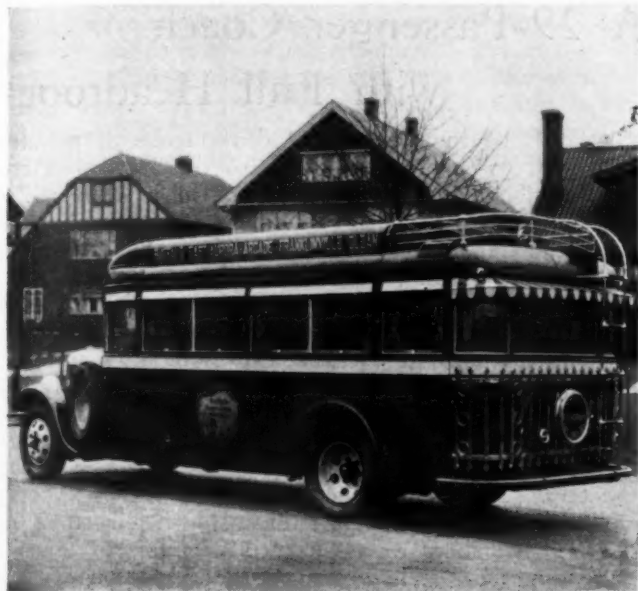
Current consumption varies in proportion to the number of gallons of fuel pumped. Ordinarily the current consumed with a six-volt system is only .04 amp., or equivalent to about one-sixth the battery drain of a radio tube. Units are made for 6-, 12- and 32-volt electric systems.

In operation the pump is driven by a magnet which flexes a copper bellows on the suction stroke. The discharge stroke, which is caused by the bellows reaction, is controlled by the carburetor float. As the float falls the bellows discharge stroke takes place after which the magnet automatically draws the bellows back for the

subsequent suction on stroke. As the float rises and closes the needle valve, the bellows reaction ceases until the float again drops.

Lang 21-Passenger Junior Pullman Motor Coach Body

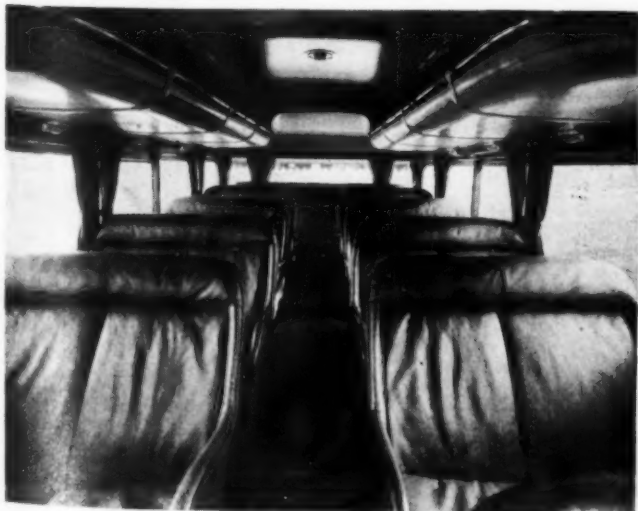
THE Lang Body Company, Cleveland, Ohio, has announced its 21-passenger junior Pullman motor-coach body, which is mounted on the Yellow W and the White Model 65 chassis. It is some-



Lang 21-Passenger Composite-Body Parlor Coach

what unusual because of the use of tee irons in place of wooden pillars in places requiring greatest strength.

The body is not tied to the dash because of the use of the full-floating front, therefore, giving a freedom of movement at this point with the resultant elimination of great strain that is the source of noise and looseness. The inside baggage racks are cast from lynite. All wires



Arrangement of the Baggage Racks

are carried in a metal-covered recess in the baggage rack, which makes them readily accessible. The body also features full headroom with parlor-car appointments.

Redesigned Exide Motor Coach Battery

ALL motor-coach batteries manufactured by the Electric Storage Battery Company, Philadelphia, Pa., are now assembled in trays that are of heavier construction and prepared with a special treatment to improve their acid-resisting qualities. This treatment is in addition to the usual acid-resisting paint



Exide Motor-Coach Batteries Are Now Assembled in Trays of Heavier Construction

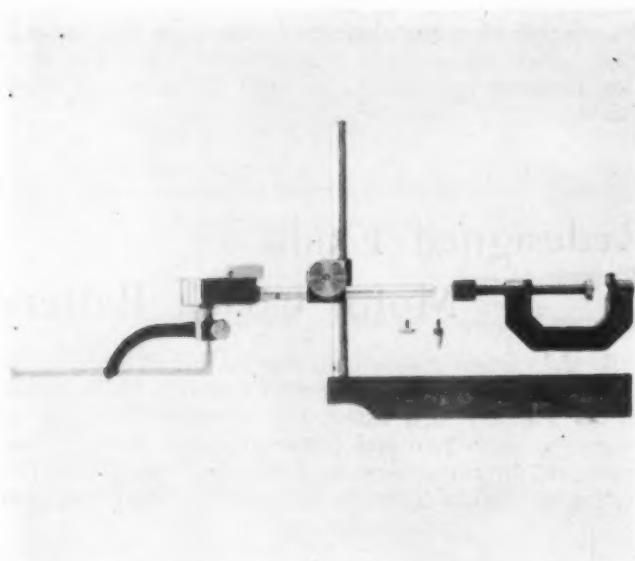
that has always been used on these batteries. A new and larger handle is also a part of these trays.

This new method of assembly, provides a rugged unit, built to stay in service as a unit during its normal service life.

Universal Dial Indicator

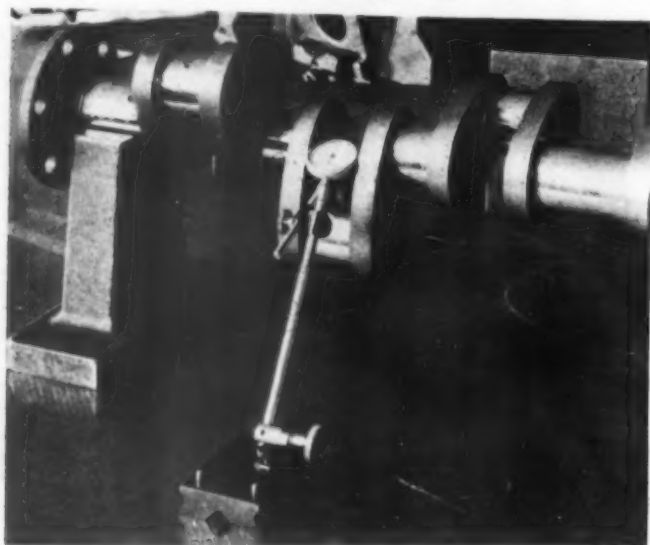
THE universal dial-indicator set No. 740 recently placed on the market by the Brown & Sharpe Manufacturing Company, Providence, R. I., is a tool, the compactness and convenience of which make it useful in many places inaccessible to the ordinary indicator.

The tool can be adjusted to almost any position and can be readily used in narrow places and in holes. The outside diameter of the dial which is $1 \frac{11}{16}$ in., is small enough to permit the easy insertion of the tool between the throws of a crankshaft for inspecting



Brown & Sharpe Universal Dial Indicator—Set No. 740

crankshaft bearings and pins. It can be used on a universal surface gage and is easily adjusted for use on the



Method of Using the Indicator for Checking a Crankshaft tool post of a lathe, on a planer tool, or on a milling-machine arbor.

Long life and accuracy are assured by the fact that the helical cam, which is the heart of the mechanism, has four sections and may be turned to bring a new section into play if wear or accident should impair the accuracy of the indicator. The dial is adjustable and, by turning the knurled rim, the zero may be brought into any position. A range of 1/16 in. either side of zero is provided, and the dial is graduated in thousandths.

The tool consists of a dial indicator, with a hole attachment, a bar with an upright rod, a slide with an indicator rod and three chromium-plated contact points.

A 29-Passenger Coach with Full Headroom

ALL of the luxury and convenience of private-car ownership, with none of the drawbacks, are embodied in the new P-12 full-headroom, 29-passenger parlor coach announced recently by the American Car & Foundry Motors Company, 30 Church street, New York.

The principal features of this coach model are: Full headroom, which allows the tallest passenger to walk the entire length of the coach without stooping; and built-in baggage racks which provide approximately 100 cu. ft. of storage space. This permits baggage to be placed inside where it will be protected fully against the elements and readily accessible at all times during the trip. The over-all height of the coach is only slightly more than 102 in.; the inside headroom is 77 in. The weight per passenger is 225 lb.

Seating comfort is furnished for 29 passengers, exclusive of the driver. Ample leg room and good visibility contribute further to the comfort of the passengers. The seats are covered with hand-buffed leather and are of the loose-cushion type.

The Hall-Scott engine, standard equipment on all A. C. F. motor coaches, comprises the power plant of the unit.

Exterior appearance has not been sacrificed to provide the ample headroom and extra baggage space. They have been gained by making the coach wider and longer so that perfect symmetry of outer appearance, with inner coach luxury and convenience, has been maintained.



A.C.F. P-12 29-Passenger Parlor Coach with Full Headroom

"Questions and Answers"

From a number of sources, suggestions have been received that a department should be established in the *Motor Transport Section* in which officers in charge of one phase or another of motor coach or motor truck operation might discuss with each other questions or problems of mutual interest. It has been stated that such a clearing house of practical operating experience would serve a worth while purpose, and would be of genuine use to many of our readers.

Many railway officers are still new at the game of motor coach and truck operation. They are having to solve daily problems of operation or maintenance procedure which, being new to them, are troublesome. Usually these are questions the answers to which have been developed during the experience of other similar

establishment of a new department wherein motor transport operation and maintenance officers might compare notes appears to offer an opportunity to be of such use. Consequently, in this first issue of the *Motor Transport Section* with its doubled editorial contents and broader editorial scope, the "Questions and Answers" department is established.

This department, more than any other, will be by and for our readers. Whether it will fulfill the expectations of those who have suggested that we establish it, is a matter depending almost entirely upon our readers. Questions for publication in this department must come from our readers, and answers likewise. We therefore cordially invite everyone to submit for publication any questions regarding any phases of motor coach or motor

Question No. 1 Motor Coach Operation in Remote Territory

"In establishing motor coach service in small, out of the way places, is it better for the railroad to secure franchises and operate its own line or to contract with some motor coach operating concern already established in or near that territory?"

One of the thoughts in this matter is that the coach concern already established has all of the facilities at hand for taking care of the situation, while, if the railroad enters the field, it must build up an organization. At times the locality is so far off it is not subject to close supervision."

Question No. 2 Types of Containers

"In the handling by truck of l.c.l. freight, with an operation requiring the use of removable van bodies, with a cubic capacity of about 1000 cubic feet and a net load capacity of 5 tons, which is more practicable and economical:

1. A body that lifts on and off the vehicle, or

2. A body that rolls on or off the vehicle?

If the latter, which is more practicable:

1. A body that rolls on casters, or

2. A body that slides on skids?"

but older operating companies. If there were available some ready means of intercommunication between the man with a new problem in his hands and other men who have had experience in dealing with the same or similar problems, the question might be answered readily and promptly, and without the necessity of recourse to the sometimes costly cut-and-try method of solving operating problems.

Nor is the officer new to motor coach or truck operation the only one who might be expected to benefit from a readily available clearing house of practical suggestion and information. Motor coach and truck operation is still comparatively new to everyone, even those who have been engaged in it from the beginning. New problems are constantly arising which might be dealt with most intelligently if the best brains of the motor transport industry were to consider them together, "around the conference table", so to speak.

It is the purpose of the *Motor Transport Section* to be of the greatest possible use to its readers. The es-

truck operation upon which they would like to know the experience or opinions of others qualified to answer. Likewise, we earnestly solicit the co-operation of our readers in voluntarily contributing answers to the questions published.

Both questions and answers should be submitted to the Editor, *Motor Transport Section, Railway Age*, 105 West Adams Street, Chicago. Questions, of course, will not be paid for, but from \$2 to \$5 will be paid for answers acceptable for publication.

The name of the department, shown at the head of this announcement, is a temporary one. We should like very much to receive suggestions for a better name. A number of such suggestions have already been made, but additional ones are desired. It is hoped that a decision will be reached in time for the publication of the department under its permanent title in the July 27 issue.

Preliminary announcement of this new department brought two questions of general interest, which are

submitted herewith. The first of these was received in time for forwarding by letter to a few officers who have had experience on this matter. Their replies are published following this announcement. Additional replies to Question No. 1 and also replies to Question No. 2 will be published in the next issue.

This is a blanket invitation to all our readers to give the benefit of their experience to the men submitting these questions, as well as to others interested, by submitting replies at their earliest convenience. And everyone is likewise invited to submit as many questions concerning as many motor transport matters as he may see fit, not only now but at any time in the future. This department is open to all. The more who participate in it, the better.—The Editor.

Replies to Question No. 1

Motor Coach Operation in Remote Territory

This is in reply to the question with reference to the operation of a motor coach service in out-of-the-way localities.

Generally speaking, a railroad should operate its own motor coach service, preferably through a motor coach subsidiary. There are no doubt, however, situations where the railroad might to advantage use a local operator.

I think we will have to admit that the independent operator of a one or two coach line gets more of the personal service element, which is so desirable, than does the large operator. The public is satisfied with a poorer grade of service from the small operator than it is from the railroad operator; but I think the tendency would be for the small operator, coming under the jurisdiction of the railroad, to lose some of his personal interest; and on the other hand the public would expect a higher grade of service.

Sometimes it helps to get a better public sentiment if a local man is used to provide a substitute service.

I would not advise contracting for motor coach service unless some of these elements of advantage are evident in the particular case under consideration.

H. F. Fritch

Passenger Traffic Manager, Boston & Maine

The answer to the questions asked would depend upon the circumstances surrounding the situation. As a general proposition, however, I believe it would be preferable to contract with a local man, because (1) he could operate the service more economically, probably giving it his personal supervision; and (2) if friendly relations were established by the railroad company, he would influence traffic via the railroad trains.

W. D. Duke

General Manager, Richmond Fredericksburg
& Potomac

Replying to the question regarding the proposition of motor coach service in out-of-the-way localities, as to whether this should be conducted by a railway subsidiary organization or through contract with some motor coach concern established in or near that territory:

Of course the answer would depend largely on the circumstances. It has been our policy, generally, to maintain our identity by holding the franchises, and by conducting the operation with our own forces and equipment. There has been one exception to this practice where passenger service was abandoned entirely and a local operator had been conducting motor coach service on Sundays. Joint application was made by the respective interests, the railroad to abandon the unprofitable passenger service and the operator to operate motor coach service on weekdays as well as Sundays.

The location in question is removed from our general center of motor coach activities; and in this instance, it was thought inadvisable to undertake a segregated operation, which probably would not be profitable to us, whereas with the other operator it would represent one branch of his activities and could more likely be made profitable.

You will recall there was some discussion of this question at the Motor Transport Division meeting in Detroit, when the prevalent opinion seemed to be that franchises, particularly in communities that had any possibility of expansion should be held directly or indirectly by the railroad, even though at the time the motor coach service was to be operated it might not be expedient for it to undertake the operation directly.

Our position has been and still is that service by motor coach presents no new fundamental principles in transportation, and that forces trained in the conduct of transportation, such as those of a railroad organization, should be fully qualified to meet any exigency in the transportation field.

A. C. Tosh

Superintendent, Reading Transportation
Company



The Stores Department of the
C. N. R. Uses a Number of
Trucks of This Type.



NEWS of the MONTH



Pennsylvania Acquires Interest in Greyhound Motor Coach Lines

** Highway concern to be operated as affiliated enterprise of railroad—Co-ordination begins on Philadelphia-Pittsburgh route*

Acquisition by the Pennsylvania of an interest in the Greyhound Lines, Inc., long distance motor coach operating company, was announced by the railroad on June 6, the announcement further stating that the highway concern will hereafter be operated as an affiliated enterprise of the Pennsylvania. The Greyhound Lines now operate an extensive long distance motor coach service which links Chicago, St. Louis, Cleveland and other cities of the middle west with Pittsburgh, Philadelphia, Washington, Baltimore and other eastern points. The first step in the co-ordination of existing Greyhound routes with the highway operating plans of the Pennsylvania was taken on June 10 when improved motor coach schedules were installed between Philadelphia and Pittsburgh. J. F. Deasy, assistant vice-president in charge of operations of the Pennsylvania and general manager of the Pennsylvania General Transit Company, its highway subsidiary, has been elected a director of the Greyhound Lines. Rumors that the Pennsylvania had acquired a substantial interest in the Greyhound lines have persisted for some time, but this is the first official confirmation of them.

As announced in the *Motor Transport Section* of May 25, page 1254, the Pennsylvania General Transit Company, highway subsidiary of the Pennsylvania, was on May 9, granted permission by the Public Service Commission of Pennsylvania to



J. F. Deasy

operate motor coaches over two routes across that state from the New Jersey boundary to the Ohio line. Operations under these certificates however will now be carried on by the Greyhound Lines,

Long Distance Truck Service by Greyhound

Long distance motor truck service for the transportation of household goods will soon be established by the Greyhound Lines through a new subsidiary of the Motor Transport Corporation, the Greyhound Vans, Inc. The new company is expected to operate throughout the territory served by the Greyhound Lines. The van bodies are mounted on rebuilt motor coach chassis.

acting as agent of the Pennsylvania General Transit Company.

Under the schedule five daily round trips are made between Philadelphia and Pittsburgh. Three of these trips are operated over the Lincoln highway and two over the William Penn highway. On the Lincoln highway route the motor coaches leave Philadelphia at 8:00 a.m., 6:15 p.m. and 11:00 p.m. Leaving times from Philadelphia on the William Penn route are 6:50 a.m. and 3:00 p.m. The east-bound schedules provide for trips leaving Pittsburgh via the Lincoln highway at 8:00 a.m., 6:50 p.m. and 11:00 p.m. and

via the William Penn highway at 6:50 a.m. and 3:00 p.m. All motor coaches arrive at, and depart from, Broad Street station, Philadelphia, and from stands in the vicinity of Pennsylvania station, Pittsburgh.

Intermediate stops on the Lincoln highway route include such points as Downingtown, Coatesville, Lancaster, Columbia, York, Waynesboro, Greencastle, Mercersburg, Chambersburg, Bedford, Ligonier, Greensburg, Wilkinsburg and certain other points. Between Pittsburgh and the Ohio State line, connecting motor coaches will also stop at Rochester and Beaver Falls.

The William Penn Highway route follows the Lincoln highway as far as Lancaster. Beyond that point the stops will include such points as Elizabethtown, Middletown, Harrisburg, Lewistown, Mt. Union, Huntingdon, Tyrone, Hollidaysburg, Altoona, Cresson, Ebensburg, and Blairsville. At Wilkinsburg this route rejoins the Lincoln highway into and through Pittsburgh.

Where highway traffic and other conditions permit, stops at the various points enroute will be made at the Pennsylvania Railroad station in each city or town. It has, however, not been found practicable to arrange the routings to do this in all cases.

The fare between Philadelphia and Pittsburgh is \$8 in each direction, as compared with a train fare of \$12.58. The motor coach running time between the two cities by either route is approximately sixteen hours, including meal and rest stops. Pennsylvania railroad tickets between any two points covered by either of the two motor coach routes will be honored on the motor coaches for either the whole, or part of, the journey at the option of passengers. Motor coach tickets, however, will not be honored on Pennsylvania trains because of the higher fare basis on the latter. Ultimately, it is stated, the intention is to work out plans whereby passengers may utilize trains at night with the convenience of sleeping car accommodations, and transfer to motor coaches by day.

"In entering these arrangements," the statement further points out, "The Pennsylvania railroad management was largely guided by the fact that the Greyhound Lines are prepared to furnish for the service the best trained and most experienced motor coach employees in the country, as well as an administrative staff which is regarded, not only as the largest but as the most skillful and successful in the passenger motor coach field. This will assure to patrons the

maximum of dependability and comfort together with general standards of operation and service which are conceded to be the highest yet established."

Seventeen new 33-passenger motor coaches have been ordered for the Philadelphia-Pittsburgh service. Eleven of these have been delivered and early delivery is expected on the remaining six, according to the announcement.

"At various points along both routes" the statement concludes, "local motor coach lines, serving limited areas of territory, are already in successful operation and furnishing satisfactory service. In these instances, the Pennsylvania will not compete with such established local lines for the local service and will, therefore, not carry passengers from point to

point within territory covered by these lines."

This is the most important step yet taken by the Pennsylvania in its program of co-ordinating rail and highway service in its territory. Its policy in this respect was stated last January, when the management issued this statement: As a result of several years' careful study and consideration, plans have been worked out and adopted for the complete coordination of rail and motor coach passenger service in the territory served by the Pennsylvania lines. The coordinated service will be established progressively, where need exists or arises either in the public interest or to encourage the continued development of the company's general passenger traffic.

Another Regulation Bill Introduced in Congress

Congressman Parker of New York on June 10 introduced in the House of Representatives a new bill to provide for the regulation of interstate commerce by passenger motor vehicles operating as common carriers on the public highways. This bill, which is designated as H. R. 3822, appears to be a duplicate of the bill introduced by Congressman Parker in the previous session of Congress, H. R. 15621, upon which hearings were held without the bill being put to a vote.

The present bill provides that all interstate common carrier motor coach lines must secure certificates of convenience and necessity as a pre-requisite to opera-

tion, and puts in the hands of the Interstate Commerce Commission, or of joint boards made up of representatives of the various state commissions involved, the administration of the regulatory measures provided under the bill. Like its predecessor H. R. 15621, the new bill possesses a "grandfather clause," which provides that lines which were in operation on November 1, 1928, and have since been in continuous operation and which can furnish proof of *bona fides* of operation, shall be granted certificates as a matter of course.

The bill was referred to the Committee on Interstate and Foreign Commerce and ordered to be printed.

I. C. C. Issues Decision on St Louis Trucking Investigation

The Interstate Commerce Commission has made public its decision on the investigation which it instituted into the "transfer of freight within St. Louis, Mo., and East St. Louis, Ill., by dray and

truck for and on behalf of the railroads." The decision of the commission follows closely the proposed report on this case prepared by Attorney-Examiner Harry C. Ames, which was reported in detail in the *Motor Transport Section* of the *Railway Age* of August 25, 1928, page 386-390. The summary of the commission's decision is as follows:

"The proposal of carriers, other than the Chicago & Alton, to employ a single transfer company for the operation of off-track stations and the haulage between such stations and the on-track stations of the railroads, and in the interchange of freight between railroads, is not violative of any provision of the Interstate Commerce Act.

"The proposal of carriers, other than the Chicago & Alton, to reduce the number of off-track stations in St. Louis from 12 to 7 and at East St. Louis from 3 to 2, will not be harmful to the public interest or result in unreasonable or inadequate service.

"The present and proposed maintenance of a constructive station at the west end of Eads bridge as an aid to the direct

receipt and delivery of freight from and to shippers and consignees is not unlawful and as at present operated does not result in unlawful practices.

"The proceedings will be held open in order to afford opportunity to respondents to enter into a cost study of the service considered, and to prepare new tariffs and new contracts in the light of such study, to be presented at a further hearing."

Pacific Electric Extends Store-Door Service

The Pacific Electric which established store-door collection and delivery service in 24 cities on its lines on March 11, as reported in the *Motor Transport Section* of March 23, has recently extended this service greatly. On June 1, it established this service at 20 additional cities. With this addition, practically all of southern California is covered, the only exception being Los Angeles Harbor which is 20 miles from Los Angeles.

The proposal to extend the improved service to Los Angeles Harbor is under consideration, but several intricate problems will have to be disposed of before this step is taken, according to officers of the Pacific Electric Motor Transport Company, which provides the collection and delivery service at the various points served. Extension of the service to the Harbor is expected to attract a greatly increased tonnage.

The addition of 20 cities to those already provided with the new freight-handling facility was made in response to the increasing popularity of the service, and to requests of shippers that the motor transport company spread out into additional territory.

Northland Operating Royal Rapid Lines

The Northland Transportation Company has taken over the operation and maintenance of the motor coaches owned by the Royal Rapid Lines of Minneapolis, Minn. This company serves a number of routes in Wisconsin, Minnesota and Illinois.

The Royal Rapid Lines has two main routes between Chicago and the Twin Cities, one running via LaCrosse, Wis., and the other through Eau Claire. Four round trips are operated daily on the former route, two of them via Rockford, Ill., and two via Lake Geneva, Wis. One round trip is operated daily on the Eau Claire route.

Branch lines extend from Dubuque, Iowa, to Madison, from Dubuque to Rockford; from Madison to Sun Prairie, Wis.; from LaCrosse to Eau Claire; from Minnesota City to Mankato; from Hudson, Wis., to Ellsworth; and from Hudson to Rice Lake.

The operation of these lines is now directed from Minneapolis by R. W. Budd, manager of operations of the Northland Transportation Company, and the Royal Rapid motor coaches are maintained in the Northland garage at the same point.

Hold Final Meeting on Specifications Code

The final meeting for the revision of the Uniform Motor Coach Specifications Code, fostered by the Society of Automotive Engineers and the National Automobile Chamber of Commerce, was held at Washington, D. C., on June 20. The code was prepared about two years ago and was distributed throughout the country for criticism by interested parties. R. J. Littlefield, manager of motor coach service of the Boston & Maine Transportation Company, attended the Washington meeting as an observer on behalf of the Motor Transport Division of the American Railway Association.

Texas & Pacific Establishes First Motor Coach Line

The Texas & Pacific on June 7 began the operation of train connection motor coach service between Millsap, Tex., on its main line and Mineral Wells, a distance of 8.6 miles. The motor coaches are operated by the newly organized motor coach operating subsidiary of the Texas & Pacific, Texas Pacific Coaches, Inc.

Millsap is located on the main line of the Texas & Pacific, 45 miles west of Ft. Worth, Tex. A paved highway traversing a section of the Palo Pinto Range connects Mineral Wells with Millsap.

All through passenger trains of the Texas & Pacific, including the Sunshine Special, the Texan and the Louisiana Limited, now stop at Millsap, and the motor coaches meet the trains at that point and carry passengers to the principal hotels in Mineral Wells. Likewise, the motor coaches pick up passengers at the principal hotels and the passenger station in Mineral Wells and carry them to Millsap, where connection is made with through trains eastbound and westbound.

All one-way and round trip tickets sold to and from Mineral Wells are honored via Millsap in connection with the Texas Pacific Coaches. Baggage checked to and from Mineral Wells is handled via Millsap in connection with trucks operated by Texas Pacific Coaches.

Two motor coaches have been purchased to provide this service, one a Model 54, 29-passenger White parlor coach and the other a Model 65 parlor type White motor coach. Six round trips daily are being operated over the Millsap-Mineral Wells route.

Propose Substitution of Highway for Rail Service

The International-Great Northern and the Houston & Brazos Valley have applied to the Railroad Commission of Texas for permission to substitute motor coach and truck service for the present rail service between Houston and Freeport.

The rail service for which it is proposed to substitute the highway vehicles is now provided by rail motor cars.

Missouri Pacific Denied Right to Substitute Motor Coaches for Trains

The application of the Missouri Pacific railroad to discontinue passenger trains Nos. 212 and 215 between Pleasant Hill, Mo., and Joplin, and the application of the Missouri Pacific Transportation Company for permission to operate a motor coach line between Kansas City and Joplin, replacing the train service between Pleasant Hill and Joplin, was denied by the Missouri Public Service Commission on June 11.

The commission order pointed out that under the state law, no new motor coach operating permit may be granted unless the existing line on the route proposed to

Railroads Propose Coach Line to Pike's Peak

Application of the Denver-Colorado Springs-Pueblo Motor Way, Inc., subsidiary of the Denver & Rio Grande Western and the Colorado & Southern, for permission to operate a motor coach line between Denver, Colo., and the summit of Pike's Peak, was heard by the Colorado Public Utilities Commission on June 8. The application was opposed by the Denver Auto Livery Owners' Association, members of which now handle most of the motor tours business between Denver and the top of the famous mountain.

The Denver-Colorado Springs-Pueblo Motor Way at present operates a motor coach service between Denver and Pueblo, supplementing the train service of the Denver & Rio Grande Western and the Colorado & Southern.

be served by the new company does not give convenient and adequate service. In the opinion of the commission, there is no necessity for additional motor coach service on the Kansas City-Joplin route.

This decision of the Missouri commission is not in accord with decisions of the Pennsylvania Public Service Commission and the Railroad Commission of California, which in similar cases has granted certificates to railways, permitting them to operate motor coaches in direct substitution for trains on routes already covered by certificated motor coach lines.

St. Louis-Kansas City Schedule Approved

The Missouri Public Service Commission has approved the new tariff filed by the Pickwick-Greyhound Lines, operating between St. Louis, Mo., and Kansas City over Federal Highway No. 40. The new rates are 3 cents a mile for the first 50 miles, 2.75 cents a mile for the next 50 miles, 2.5 cents a mile for the third 50 miles, 2.25 cents a mile for the fourth 50 miles, and 2 cents a mile for each mile over 200 miles on any trip.

Missouri Pacific Proposes Coach Lines in Nebraska

Application of the Missouri Pacific Transportation Company, motor coach operating subsidiary of the Missouri Pacific, to operate motor coach lines paralleling its railway lines between Omaha, Neb., and the state line on the south, and between Nebraska City and Lincoln, was heard by the Nebraska Railway Commission on June 7.

Four independent motor coach operating companies filed objections and are reported to have raised in their objections these two questions: Whether the present independent lines, by reason of having

had their schedules and routes approved, have acquired rights to use the highways and streets traversed which cannot be invaded by new applicants for permission to operate over the same routes; and whether the commission does not have the power to deny permission to use these highways when the public convenience is adequately served by the existing lines.

The commission itself is reported to be divided on these questions and it is expected that they will be submitted later to the courts.

Bus Division, A. A. A., to Meet at Buffalo

The National Motor Bus Division of the American Automobile Association will meet at the Hotel Lafayette, Buffalo, N. Y., on July 1-2, according to an announcement by John M. Meighan, secretary of the division. This meeting will be held in conjunction with the annual meeting of the American Automobile Association.

Among the speakers already announced are O. S. Caesar, president of the Motor Transit Management Company of Chicago, who will speak on "The Importance of Advertising the Motor Coach Business"; Warren E. Libby, chief counsel of Pickwick Stages, Los Angeles, Cal., who will speak on "The Legal Rights and Liabilities of the Motor Carrier on the Highway"; and A. P. Warner, general manager in charge of traffic of the Public Service Co-ordinated Transport, Newark, N. J., who will speak on "Special Party Service—Its Advantages if Properly Developed."

P. & L. E. Begins Truck Service

The Pittsburgh & Lake Erie recently substituted trucking service for local freight train service on its Monongahela division between Pittsburgh and Brownsville, Pa. A concentration point has been established at Monongahela and merchandise freight for the Monongahela division stations, served by the motor trucks, is loaded in Monongahela cars for break up and truck distribution from there.

In the outbound direction motor trucks

Merged Pacific Lines To Improve Equipment

As the first result of the recent merger of the four major motor coach lines on the Pacific coast including the Southern Pacific Motor Transport Company, an expansion program involving the expenditure of several million dollars for improved equipment and terminal facilities, has been announced by officers of Pacific Transportation Securities, Inc., the new holding company. This expenditure will be made during the next three years. One of the first improvements to be carried out will be the construction of additional large motor coach terminals in important cities served by the companies in the group.

collect freight at the smaller stations and haul it into Monongahela for loading into Pittsburgh cars for transfer and consolidation at the latter point.

Truck Regulation Law in Texas

The Texas law placing the operation of common carrier motor trucks under the regulatory supervision of the Texas Railroad Commission, became effective on June 12. In assuming jurisdiction the Commission announced that all applications for certificates to permit operation must be accompanied by an insurance policy covering each truck or trailer to be operated in the amount of \$5,000 for injury to one person, \$10,000 for injury to more than one person in one accident, \$1,000 for property damage and \$2,500 as cargo insurance to protect shippers. Such policies must also contain a \$5,000 indemnity clause guaranteeing the delivery of shipments.

The Commission has ordered that all these features must be incorporated in one policy which will bind the insurance company to pay all judgments against the operator.

Burlington to Increase Nebraska Service

Members of the Nebraska Railway Commission on June 3 heard the application of the Burlington Transportation Company, subsidiary of the Chicago, Burlington & Quincy, for authority to augment its present motor coach service between Lincoln, Neb., and Omaha, and between Lincoln and Grand Island. Objections to the proposal were filed by the Interstate Transit Company, the Atlantic & Pacific Stages, the Cornhusker Stage Company and the Queen City Coach Company.

Union Pacific Buys Another Coach Line

The Union Pacific Stages, Inc., motor coach operating subsidiary of the Union Pacific System, has acquired the Spokane-Umatilla, Wash., line of the Auto Inter-urban Company. Two round trips daily will be operated between Spokane and Portland, via Umatilla, by Union Pacific Stages. The purchase price of the Spokane-Umatilla line is reported to have been \$72,000.

Orders for Equipment

THE MISSOURI PACIFIC TRANSPORTATION COMPANY has received one 29-passenger A.C.F. parlor type motor coach.

THE FONDA, JOHNSTOWN & GLOVERSVILLE has accepted delivery of four Mack, model AB, four-cylinder, 25-passenger city type motor coaches.

THE MISSOURI PACIFIC TRANSPORTATION COMPANY has ordered one Type Y and four Type W Yellow parlor motor coaches.

THE BURLINGTON TRANSPORTATION COMPANY has ordered 20 Type W Yellow parlor motor coaches.

THE NORTHLAND TRANSPORTATION COMPANY has ordered six Type Y Yellow motor coaches.

THE CENTRAL TRANSPORTATION COMPANY, highway subsidiary of the Illinois Central, has ordered one Type Y Yellow parlor motor coach.

THE ATLANTIC CITY & SHORE has ordered seven Type Z-29 Yellow motor coaches.

THE UNION PACIFIC has ordered three Type W Yellow parlor motor coaches. These vehicles will be used in highway services of the Oregon, Washington Railroad & Navigation Company.

THE BALTIMORE & OHIO has ordered two Type Y Yellow parlor motor coaches.

THE UNION PACIFIC has accepted delivery of five White Model 65, six-cylinder motor coaches.

THE MISSOURI PACIFIC has ordered six White motor coaches, four of which will be Model 65 and two Model 54.

THE UNION PACIFIC has accepted delivery of five Type W Yellow observation motor coaches.

THE SOUTHERN PACIFIC MOTOR TRANSPORT COMPANY has accepted delivery of two six-cylinder parlor type Fageol motor coaches.

Among the Manufacturers

Arthur D. Lierman has been appointed advertising manager of the Mack-International Motor Truck Corporation, with headquarters at Long Island City, N. Y.

L. G. Avery, manager of the sales promotion department of the White Company, Cleveland, Ohio, has been promoted to manager of the Detroit district. Walter A. Maynard, transportation engineer, has been promoted to sales promotion manager.

C. W. Ort, manager of the Spokane, Wash., branch of the United States Rubber Company, has been appointed manager at Portland, Ore., succeeding J. D. Ferris, who has been transferred to San Francisco, Cal.

L. M. Simpson has been appointed general sales manager of the tire division of the United States Rubber Company, with headquarters at New York.

G. W. Davis, has been appointed sales manager of the Fitzjohn Manufacturing Company, makers of motor coach bodies, with headquarters at Muskegon, Mich.

The Rubber Manufacturers' Association, Inc., has been organized to take over the Rubber Association of America, Inc., and the Rubber Institute.

M. L. McGrew, formerly associated with the Chicago office of Mack Trucks, Inc., has resigned to join the Büssing Motors Company of America, with offices at 3673 South Michigan avenue, Chicago. The Büssing Motors Corporation of

America was recently organized for the purpose of manufacturing and distributing the six-wheel trucks and motor coaches like those now manufactured by the Büssing organization in Germany.

Motor Transport Officers

A. S. Larrabee, superintendent of trucking, Boston & Maine Transportation Company, has resigned and H. E. Hanson, former inspector of trucking, has been appointed supervisor of trucking at Boston. Other recent changes in the organization involved the appointment of L. L. Ricker, former assistant superintendent, to the position of general freight agent and J. L. Kelly, former dispatcher, Portland division, to assistant to the manager of trucking operations.

Frank C. Jerome, general freight agent of the New York Central, with headquarters at New York, has taken over the direction of the New York Central's trucking activities which were formerly supervised by G. C. Woodruff, who recently resigned as assistant freight traffic manager of this road to become chairman of the U. S. Freight Company. Mr. Jerome has been general freight agent of the New York Central since April, 1927. He was born in New Haven, Conn., and entered the service of the New York



Frank C. Jerome

Central as a junior clerk in the general freight office. He later became secretary to the general freight agent, subsequently serving as chief clerk in the New York traffic office of the Merchants Despatch Transportation Company, contracting agent at the Wall street office, chief contracting agent in the Broadway office of the New York Central and then successively westbound agent and commercial agent for the same road. Upon the return of the railroads to private ownership following federal control, Mr. Jerome was appointed assistant to the freight traffic manager. He became general eastern freight agent in 1921 and in 1925, he was appointed assistant general freight agent, serving in that capacity until 1927 when he was appointed general freight agent, lines Buffalo and east and the West Shore Railroad.